BLISTER RUST WORK
IN THE FAR WEST

January 1 to December 31, 1926

Spokane Branch
Office of Blister Rust Control,
618 Realty Building
Spokane, Washington

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FIRE POLICY

The Office of Blister Rust Control recognizes that since it is engaged upon a specific part of the general forest protection program it has a distinct reponsibility in forest fire prevention and suppression. It also realizes, however, that because of the specialized nature of Blister Rust Control work, the objective toward which this office is working cannot be reached if its work is each summer delayed by an extended period of fire suppression duty.

The degree to which Blister Rust Control men should be used for fire suppression depends upon the type of work they are doing. Such men fall generally into two groups: (1) scouts and supervisors, and (2) foremen and laborers. The first group, relatively few in number, consists of more highly trained and better paid men, who are largely engaged upon advance work involving considerable responsibility. These men should be exempted from fire duty in any year except when a very general and serious emergency arises, such as 1926 on the Kaniksu National Forest.

The second type, foremen and laborers should be considered as part of the normal fire protection organization. They would be subject to call for fire suppression at any time and could be retained as long as necessary, unless it was considered better policy to replace them and return them to their regular location in order to give more equal protection to the entire area.

W157-W176.
50 year old white pine stand, on St. Joe River, Idaho. Typical of Dense Pole eradication type. This stand is practically Ribes free.

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* * * *

INTRODUCTION

The following report on the activities of the Western Branch of the Office of Blister Rust Control, Bureau of Plant Industry, for the period January 1, 1926 to December 31, 1926, covers the work of this Office for the fifth calendar year since the discovery of white pine blister rust in the West. While the introduction to the previous annual reports of this Office has given very briefly the status, at the end of each year, of the rust itself, it may be of value at this time to briefly summarize the work which this Office has done as well as the spread of the rust. The current progress of the spread of the rust and also of the development of our work is given below in tabular form:

Yearly Progress

Year	The Rust	The Work
1922	Found in Puget Sound region of Washington, and interior of British Columbia.	Largely confined to scouting for the disease, cultivated black currant eradication in western Washington, and quarantine inspection. A very small experimental Ribes eradication carried on at Elk River, Idaho.
1923	General spread of the rust over the dry belt of B. C. and into north central Washington First Ribes infections found at Nelson, B. C.	Extension of cultivated black currant eradication program to Montana, Idaho, Oregon, and California. Small experimental Ribes eradication project on Priest River Experiment Station. Beginning of reconnaissance.
1924	Practically no spread of the rust	Satisfactory development of cultivated black currant eradication program. Larger experimental Ribes eradication project in Upper Priest River Valley. Reconnaissance applied over north end of Kaniksu National Forest.
1925	Extension of rust into northwestern Oregon. Ribes infection found over area 20 miles in extent, east and west, in the general vicinity of Nelson, B. C.	Completion of cultivated black currant eradication in Oregon. Satisfactory progress in other states. Reconnaissance extended to the Coeur d'Alene National Forest and to lands of private timber owners of north Idaho. Further experimental Ribes eradication in Upper Priest River Valley and new project on Crater National Forest, Oregon.
1926	Development of pine infection on Olympic Peninsula and in vicinity of Nelson, B. C. No further spread of Ribes infection.	Completion of cultivated black currant eradication in Montana. Special development of reconnaissance methods, resulting in much more rapid work. Experimental Ribes eradication in West Branch region of Kaniksu National Forest results in material lowering of costs, by developing of scouting methods. Experimental Work shows feasibility of chemical eradication. Experimental Ribes eradication started in California. Clearer conception gained of ecology project. Quarantine 63 put into effect.

The most important features of the development of the rust in the West during these periods, has been the establishment of definite focuses of infection, one on the Olympic Peninsula of Western Washington and one in the vicinity of Nelson, British Columbia. The most striking phases in the development of our work during the calendar year 1926, have been, (1) the near completion of the cultivated black currant eradication program, (2) the development and use of reconnaissance methods which are at once sufficiently accurate to secure the information needed and are much more rapid than anything hitherto used, permitting a very great extension of this work during the past season. (3) The development of experimental Ribes eradication methods both by hand pulling and by application of chemicals. (4) The development of the ecological studies. The progress made in these last two points does not mean that these problems are solved; it merely means that we have now attained a sufficient understanding of the problems involved so that we can work upon them in a more intelligent fashion.

The work of the Western Branch of the Office of Blister Rust Control, for the period January 1, 1926 to June 30, 1926, was conducted under an allotment of funds of $140,000 for the fiscal year 1926; the work for the period July 1, 1926 to December 31, 1926, under an allotment of $160,000 for the fiscal year 1927. Both of these allotments were for the western blister rust control program only. The appropriations for these two fiscal years were allotted to the several field projects by the Secretary of Agriculture as follows:

Allotment of Funds, Fiscal Year 1926

Project	Period July 1, 1925 to June 30, 1926.
1. For application of general control measures to delay the spread of the rust including location and eradication of cultivated black currants, blister rust quarantine inspection work, nursery sanitation, etc.	$30,005.02
2. For development of local control practices by testing and improving methods of control reconnaissance, the physical and chemical destruction of Ribes and determining the ecological factors effecting local control,	27,263.34
3. For application of local control including control reconnaissance and eradication of Ribes on Federal lands,	38,585.00

Project (Cont.)	Period July 1, 1925 to June 30, 1926 (Cont.)
4. For field studies and collection of field data on spread of rust, damage to pine, etc.	$ 7,456.67
5. For scientific investigation of the behavior of the rust under western conditions.	12,000.00
6. For miscellaneous expenses, including supervision, supplies, clerical assistance, reserve, etc.	24,689.97
Total	$140,000.00

Allotment of Funds, Fiscal Year 1927

Project	Period July 1, 1926 to June 30, 1927
A. Study and Application Delay Measures	
1. Continuance toward eventual completion of eradication of cultivated black currants in the states of Montana, Idaho, Washington, Oregon and California. (preliminary control measures)	$15,000
2. Continuance of necessary quarantine inspection to prevent further dissemination of the rust through shipment of infected host plants	9,500
3. Field inspections and surveys in Oregon to determine the spread of the disease from year to year and to apply practical measures of checking it.	10,000
B. Study of Disease to Determine Important Facts influencing its Control.	
1. Pathological Investigation	12,000
C. Experimental Development and Application of Local Control Measures.	
1. Control reconnaissance to determine the potential blister rust danger in various localities and forest stand types and to estimate cost of control,	
(a) In western white pine region	10,000

Project (Cont.)	Period July 1, 1926 to June 30, 1927 (Cont.)
(b) In sugar pine region	$ 5,000
2. Large scale demonstration in the application of local control on the national forests in the western white pine belt	44,500
3. Cooperative demonstration of local control on State and private western white pine land	10,000
4. Small scale demonstrations in the application of local control on the national forests in the sugar pine belt	10,000
5. Development of improved control methods, reduction of eradication costs, and working out methods for assuring efficiency of eradication on control areas, including a study of Ribes regrowth on 1922 and 1923 control areas	
(a) In western white pine areas	10,000
(b) Sugar pine areas	4,000
6. Experiments to determine the toxicity of chemicals and to develop effective means of applying them in Ribes eradication	5,000
7. Study of Ribes ecology to determine factors influencing occurrence and regrowth of these plants in western white and sugar pine forests	5,000
D. Educational activities to inform the public concerning blister rust and to secure its cooperation in applying measures for the control of this disease	10,000
Total	$160,000

Organization and Personnel

The present organization of the Western Branch of the Office of Blister Rust Control represents a transitional stage between close centralization, in which the work is all organized under direct supervision of the Spokane Office, and a decentralization into State units. On one hand there is a fairly close knit organization of project leaders permanently headquartered at Spokane. On the other hand this office has developed branches in those

states farthest from Spokane, with each branch under the immediate supervision of a State Leader. A start has been made, in several cases, of organizing all blister rust control work in these states under the supervision of the State Leader who, in turn, is responsible to the Spokane office.

The following is the permanent western personnel which was employed during the period covered by this report:

1. Supervisory: S. N. Wyckoff, Pathologist, in charge of Western Branch Office.

2. Project Leaders:

a. Quarantine Inspection, C. R. Stillinger, Associate Pathologist.
b. Experimental Ribes Eradication, Idaho, C. C. Strong, Junior Forester in charge, assisted by Frank Patty, Junior Pathologist.
c. Control Reconnaissance on Federal Lands, H. N. Putnam, Assistant Pathologist.
d. Control Demonstration on Private Lands, J. L. Bedwell, Assistant Pathologist, assisted by W. F. Painter, H. Whiting, G. Whiting, H. Geil, J. Rodner and R. Myers, Agents.
e. Ribes Ecological Studies, W. A. Rockie, Assistant Pathologist.
f. Experimental Chemical Eradication, H. R. Offord, Agent.
g. Educational work, C. R. Stillinger, Associate Pathologist.

3. State Leaders:

Montana, C. H. Johnson, Assistant Pathologist.
Oregon, L. N. Goodding, Assistant Pathologist.
California, G. A. Root, Assistant Pathologist, assisted by P. E. Melis, Junior Forester, W. V. Benedict, Junior Forester, and E. C. Kenyon, Agent.

4. Clerical Work:

R. Calhoun, Principal Clerk and Temporary Special Disbursing Agent.
Miss M. McWold, Clerk.
Mrs. L. Klatt, Assistant Clerk-Stenographer.
Mrs. D. Dow, Under Clerk-Typist.

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d. Control [illegible] on Private Lands, [illegible], Assistant Pathologist, assisted by [illegible], H. [illegible]ing, G. Whitney, [illegible].
e. Ribes Ecological Studies, [illegible], Assistant Pathologist.
f. Experimental Chemical Eradication, [illegible], Agent.
g. Educational work, C. R. Stillinger, [illegible] Pathologist.

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Report of Work for Year

The following report is arranged as a series of state reports, under the heading of each of the five states in which this office has supervised work during the past year. The work is discussed under the several project headings. Each state report will consist of a general statement of the organization and activities in that state, the cooperative agreement under which the work was done, and the individual reports of the state and project leaders:

BLISTER RUST CONTROL WORK IN MONTANA
1926

Blister rust control work in Montana during the past year has consisted of two principal projects: (1) cultivated black currant eradication and (2) control reconnaissance work. In addition to the above there has been a certain amount of educational work done. These projects have been supervised by Mr. C. H. Johnson, Assistant Pathologist and State Leader for Montana. Through the cooperation of the Montana State Department of Agriculture, Mr. Johnson is given office space and facilities in the office of the Chief of the Division of Horticulture of that Department, in the Chamber of Commerce Building, Missoula, Montana. The following is the memorandum of understanding under the terms of which the work in Montana is organized:

MEMORANDUM OF UNDERSTANDING BETWEEN THE MONTAN STATE DEPARTMENT OF AGRICULTURE, THE MONTANA STATE FORESTRY DEPARTMENT, THE SCHOOL OF FORESTRY, UNIVERSITY OF MONTANA, AND THE BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN MONTANA.

EFFECTIVE JULY 1, 1926 to JUNE 30, 1927.

For the purpose of effectively controlling the white pine blister rust in Montana, the several cooperating agencies shall participate in a joint program as indicated below:

1. The Bureau of Plant Industry shall employ and direct the work of one or more men who shall assist in prosecuting the following cooperative activities: eliminating the cultivated black currant (Ribes nigrum) from the State by systematically locating and securing the destruction of these plants; inspecting plant shipments, in cooperation with the Federal Horticultural Board, at strategic terminal and transfer points to detect and prevent violations of State and Federal blister rust quarantines; scouting to determine the presence of the disease in the State; performing control reconnaissance; conducting experiments and demonstrations in local control methods. The Bureau of Plant Industry is responsible for the proficiency of its employees assigned to duties under the terms of this agreement, and in addition agrees to provide the necessary technical information regarding the disease to such employees of the other cooperating agencies that are assigned to work contemplated in this agreement.

2. The Montana State Department of Agriculture shall pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violations of State and Federal blister rust quarantines; shall use its regular employees, so far as their other duties permit, and shall direct the work of its cooperating horticultural officials, so far as their other duties permit, in systematically locating and destroying cultivated black currants and infected blister rust host plants, in scouting for white pine blister rust, and in inspecting nurseries for this desease. It is recognized that the Montana State Department of Agriculture has no special appropriation for blister

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rust control, and that therefore such blister rust control work as is performed by the employees of the Montana State Department of Agriculture and its cooperating horticultural officials will be done in connection with their other duties.

3. The Montana State Forestry Department shall use its regular employees, so far as their regular duties permit, in systematically locating cultivated black currants, in scouting for the blister rust, in taking such action as is deemed necessary in preventing the spread of blister rust into territory under their control and supervision, and in assisting in the performance of control reconnaissance and experimental local control.

4. The School of Forestry, University of Montana, shall assist the Bureau of Plant Industry and the other cooperators in the formulation and performance of control reconnaissance and experimental local control. It is further agreed that the School of Forestry, University of Montana, shall assign one member of its faculty to blister rust work during the field season, his salary and expenses to be paid by the Bureau of Plant Industry for such a period.

5. All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to the agreement. All findings of blister rust made by any party to this agreement shall be promptly reported to all other parties to the agreement. All specimens collected by any party to this agreement which are suspected to be infected with blister rust shall be submitted to the Bureau of Plant Industry for final determination.

6. It is provided that from July 1, 1926 to June 30, 1927, inclusive, the Montana State Department of Agriculture and its cooperators shall expend about $5,000.00, the Montana State Forestry Department about $1,200.00, the School of Forestry, University of Montana, about $300.00, and the Bureau of Plant Industry about $ 5,000.00 in connection with the work specified. All expenditures made by the Bureau of Plant Industry shall be made in accordance with the fiscal regulations of the United States Department of Agriculture.

7. This memorandum of understanding shall take effect July 1, 1926 and continue in force until June 30, 1927, or until previously terminated by mutual consent of the parties to this agreement.

Date	Signatures
Nov. 5, 1926	(s.) A. H. Bowman Montana State Department of Agriculture

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6. It is provided that from July 1, 1926 to June 30, 1927, inclusive, the Montana State Department of Agriculture and its cooperators shall expend about $3,000.00, the Montana State Forestry Department about $1,200.00, the School of Forestry, University of Montana, about $300.00, and the Bureau of Plant Industry about $ 5,000.00 in connection with the work specified. All expenditures made by the Bureau of Plant Industry shall be made in accordance with the fiscal regulations of the United States Department of Agriculture.

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Signatures	Date
(s.) A. E. Bowman Montana State Department of Agriculture	Nov. 5, 1926

Date (Cont.)	Signatures (Cont.)
Nov. 8th, 1926	(s.) Rutledge Parker Montana State Forestry Department
Nov. 9th, 1926	(s.) Thos. C. Spaulding School of Forestry, University of Montana.
Nov. 23, 1926	(s.) Wm. A. Taylor Bureau of Plant Industry.

CULTIVATED BLACK CURRANT ERADICATION, MONTANA.

by

C. H. Johnson
Assistant Pathologist.

The campaign started four years ago to exterminate the black currants in Montana is ended. A very few bushes remain scattered throughout the State, which could not be removed at the time of their location for some good reason, such as the absence of owner, death of owner, inability of owner to understand English etc. However, such cases are not forgotten and progress is being made towards removal of the scattered plantings.

It is reasonably safe to say that the black currant issue will never again be revived in this State. Nothing short of a complete breakdown in our quarantine enforcement and powerful advertising by outside nurseries can again restore the former popularity of black currants. To one who has been engaged in the every day eradication and has been in a position to note every eraction, favorable and unfavorable, it is indeed gratifying to feel that all oposition to our program has faded away so quickly. The few growers who have agreed to remove their bushes within a period of five years are living up to their agreement.

The following tables show the status of the black currant situation at the end of 1936.

Plantings and Bushes Eradicated

Table No. I.

County	At Time of Location		At Subsequent Time		Total Plantings and Plants Eradicated	
	Plantings	Plants	Plantings	Plants	Plantings	Plants
Missoula *	88	540	11	316	99	856
Ravalli *	99	703	3	37	102	740
Flathead	46	205			46	205
Lake	29	160	2	17	31	177
Mineral	8	39			8	39
Sanders	9	56			9	56
Lincoln	16	121			16	121
Silver Bow	14	44			14	44
Powell	6	25	1	48	7	73
Granite			1	3	1	3
Deer Lodge	1	2			1	2
Cascade	42	212			42	212
Fergus	7	34			7	34
Hill	1	4			1	4
Liberty	No Plantings found					
Blaine	" "	"				
Toole	" "	"				
Yellowstone	14	74	2	18	16	92
Stillwater	2	5			2	5
Carbon	2	7			2	7
Musselshell	1	2			1	2
Park	6	36			6	36
Meagher	1	4			1	4
Gallatin	11	46			11	46
Broadwater	No Plantings found					
Golden Valley	" "	"				
Wheatland	" "	"				
Sweet Grass	" "	"				
Judith Basin	" "	"				
Choteau	" "	"				
Big Horn	" "	"				
Lewis & Clark	25	407	2	14	27	421
Beaverhead	3	19			3	19
Madison	11	19			11	19
Pondera	1	4			1	4
Glacier	1	3			1	3
Teton	4	46	1	4	5	50
Jefferson	3	28			3	28
Phillips	4	85			4	85
Valley	No Plantings found					
Roosevelt	5	76			5	76
Daniels	No Plantings found					
Sheridan	1	5			1	5
Richland	1	5			1	5
Wibaux	No Plantings found					
Fallon	" "	"				
Dawson	" "	"				
Prairie	" "	"				
McCone	" "	"				
Custer	2	8			2	8
Powder River	No Plantings found					
Carter	" "	"				
Rosebud	" "	"				
Treasure	1	47			1	47
Petroleum	No Plantings found					
Garfield	" "	"				
Totals	465	3071	23	457	488	3528

* In Missoula County 3 plantings representing 238 bushes are included in the 5 year agreement explained in my last annual report. Of this total, 100 bushes have been removed leaving 138 to be eradicated.

* In Ravalli County 3 plantings representing 122 bushes are included in special agreement. 25 bushes have been eradicated.

Table No. II.

Plantings and Bushes not Eradicated

County	Plantings	Plants	Owner not willing	Owners' attitude not specified
Missoula	2	22	1 planting 17 bushes dying neglect.	1 planting 5 bushes
Ravalli	1	5	Unwilling case not closed.	
Lake	1	17	Not consulted since proclamation issued.	
Flathead	1	15	Not consulted since proclamation issued.	
Silver Bow	3	17	Will be eradicated.	
Cascade	1	7	Not consulted since proclamation issued.	
Beaverhead	1	2	Not consulted since proclamation issued.	
Pondera	1	2	No reply from letter - bushes may be removed.	
Jefferson*	2	133	Not willing 1 planting 3 bushes	1 planting 130 bushes.
Roosevelt	1	12	Willing	
Sheridan	1	29	Owner could not understand English.	
Totals	14	261		

* In Jefferson County the own r of 130 bushes died; unable at present to locate new owner.

CONTROL RECONNAISSANCE ON FEDERAL, STATE, AND PRIVATE LANDS, MONTANA, JULY 1 TO SEPTEMBER 11, 1926

by

C. H. Johnson, Assistant Pathologist

* * *

I. Purpose of Work

The field season of 1926 was the first time control reconnaissance has been performed in Montana. Previous to 1926, little was known concerning the location and extent of white pine areas and Ribes conditions thereon in Montana. Owing to this fact, the primary object of the first year's control reconnaissance was to make a systematic study of sample areas in each of the forests having white pine types, in order that plans for the complete reconnaissance of white pine types in Montana might be made.

Information desired on areas worked may be grouped into five major subdivisions as follows:

1. Timber types.
2. Timber age classes.
3. Eradication types.
4. Ribes per acre by species within each eradication type.
5. Physical factors affecting costs and methods of Ribes eradication.

II. Methods of Work

The methods of performing control reconnaissance in Montana were similar to those used on Federal and private lands of Idaho, full descriptions of which are shown in the annual report of the control reconnaissance work done in Idaho, 1926.

III. General Description of Areas

A. Accessibility.

All timbered areas which were reconnaissanced are readily accessible either by road or trail. On all future reconnaissance work in Montana it will be necessary to pack supplies and equipment to the scene of operation and remain until work is completed. The white pine areas as a general rule are isolated.

B. Forest Types Found.

The Douglas fir-larch type predominates in northwestern Montana. The white pine is very commonly found associated with the larch and Douglas fir. The more dense stands of white pine are confined to north and east exposures, in narrow draws and valleys. Other principal species found mixed with white pine are hemlock, cedar, alpine fir, Engelmann, spruce and white fir.

C. Age Classes.

The white pine areas suffered severely from the fire of 1910. Montana was almost stripped of this valuable species. Such timber as escaped the fire is confined to higher altitudes, pockets, draws and is mostly even aged, ranging from 100 years to 200 plus. In the areas heavily burned lodgepole pine has come up and is gradually building up the soil again. The 0-10 age class of white pine in such places is again making its appearance.

D. Ribes Conditions.

The four principal species of Ribes are *R. lacustre*, *R. petiolare*, *G. inermis*, and *R. viscosissimum*. *R. petiolare* thrives well along streams, particularly on better quality white pine sites. *R. lacustre* is found associated with *R. petiolare* along streams on rich quality white pine sites, extending also over the entire area, occurring in openings and clearings. *G. inermis* thrives better on the poorer soils and especially well in meadows and exposures which are not so well drained. *R. viscosissimum* is confined to dry and open sites.

IV. Results of Control Reconnaissance

During the past field season control reconnaissance in Montana was performed on areas in five national forests and one state forest.

A. Land Description of Areas Worked.

The locations and land descriptions of areas worked are shown in Table No. I.

Table No. 1

Land Description and Areas Reconnaissanced in Montana 1926

Forest	T.	R.	Intensive Reconn. Sections by No.	Intensive Reconn. Total Sects.	Intensive Reconn. Total Acres	Extensive Reconn. Sections by No.	Extensive Reconn. Total Sects	Extensive Reconn. Total Acres	Total Section	Total Acres
Kootenai	35 N	34 W	13,22,23	3	1920	11,12,14 15,21,24 25,26	8	5120		
National	36 N	32 W	19	1	640					
Forest	36 N	33 W	12,13	2	1280	1,2,11	3	1920		
Totals				6	3840		11	7040	17	10880
Stillwater	32 N	23 W	5, 6, 18	3	1920					
State	33 N	23 W	16,17,18,19,20 29,30,33	8	5120					
Forest	33 N	24 W	11,13,14 23,24,	5	3200					
Total				16	10240				16	10240
Flathead	24 N	17 W	5,6,8,18 19,25,26 31,36	9	5760					
National										
Forest	24 N	18 W	9,10,11, 12,13,14 15,16.	8	5120					
Totals				17	10880				17	10880
Missoula N.F.(N.P. Ry lands)	21 N	17 W	21,29	2	1280				2	1280
Cabinet National Forest	26 N	33 W	6,7,8,11 14,15,16 23,24	9	5760				9	5760
Lolo	18 N	30 W	4,8	2	1280					
National	19 N	29 W	1,2,11, 12	4	2560					
Forest	19 N	31 W	18,19,30	3	1920					
	19 N	32 W	4,8,9,13 14,23,24 N½25, N½ 26	9	5140					
	20 N	29 W	26,27,34 35	4	2560					
Totals				22	13460				22	13460
Grand			16	72	45460		11	7040	83	51500

The results of the work performed for each forest and for all forests are shown in tabular form under the following headings:

1. Total number of acres reconnaissanced, classified according to white pine and non-white pine types, age classes and eradication types.

2. Number of acres intensively reconnaissanced, classified according to eradication types and number of Ribes per acre, classes for each Ribes species and for all Ribes species.

3. Distribution of Ribes by species.

4. Number of Ribes per acre by Ribes species and eradication types.

It may be observed that the total acreages in 1 and 2 are not necessarily the same. This is because data were not always taken on all of the acreage even on a section worked intensively, consequently the total acreage shown in 2 often is smaller than in 1.

Also, it may be noted that the acreage in 2 sometimes is greater than the acreage of white pine type in 1. This is because Ribes data were taken on non-white pine types adjoining white pine types, and acreage figures for such areas included.

B. Results of Control Reconnaissance Performed on Kootenai National Forest.

There were 6 sections intensively reconnaissanced on the Kootenai National Forest. Few Ribes were found. These consisted of 2 species -- R. lacustre and G. inermis -- chiefly along streams. On 3 sections, namely, Sections 13, 22 and 23, T 35N, R 34 W, in Meadow Creek drainage, no Ribes were found even along streams. The streams on these 3 sections are narrow, flowing through dense mature and dense pole stands.

Tables 2 to 7 inclusive show the results on reconnaissance on the Kootenai National Forest.

Table No. 2

Total Number of Acres Reconnaissanced
Kootenai National Forest, Montana, 1926.
Classified According to Age Classes and Eradication Types

Erad. Types	White Pine Type - Age Classes 1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total	Non-White Pine Types - Age Classes 1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total
D. M.							1605	2255		3860							1720	1422	750	3892
O. M.																				
D. P.			1675	290						1965			250	40					333	623
O. P.																				
D. R.												410								410
O. R.																				
Str.			10				59	51		120							5	5		10
Brush																				
Clearing																				
Not Cla-ssified																				
Totals			1685	290			1664	2306		5945		410	250	40			1725	1427	1083	4935

Table No. 3

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Kootenai National Forest, Montana.

Erad Type	Number of Ribes lacustre per Acre Classes																						
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	3585																						3585
O. M.																							
D. P.	480																						480
O. P.																							
D. R.																							
O. R.																							
Stream	25												12	3	35	5							80
Brush																							
Total	4090												12	3	35	5							4145

Table No. 4

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Kootenai National Forest, Montana

Erad. Type	Number of G. inermis per Acre Classes																					
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	Total
D. M.	3015	570																					3585
C. M.																							
D. P.	430																						430
O. P.																							
D. R.																							
O. R.																							
Stream	80																						80
Brush																							
Total	3575	570																					4145

Table No. 5

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Kootenai National Forest, Montana.

Erad. Type	Number of All Ribes Per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	3015	570																					3585
O. M.																							
D. P.	480																						480
C. P.																							
D. R.																							
O. R.																							
Stream	25												12	3	35	5							80
Brush																							
Total	3520	570											12	3	35	5							4145

Table No. 6

Distribution of Ribes by Species
Kootenai National Forest, Montana.

Ribes Species	Percent of total Acres Reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	98.7 %	--- ---	1.3 %
G. inermis	86.2 %	13.8 %	-- ---
All Ribes	84.9 %	13.8 %	1.3 %

Table No. 7

Number of Ribes per Acre by Ribes Species and Eradication Types
Kootenai National Forest, Montana

Erad. Types	Acres Recorn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	3585				.8	.8
O. M.						
D. P.	480					
O. P.						
D. R.						
O. R.						
Str.	80	123.8				123.8
Brush						
Total & Averages	4145	2.4			.7	3.1

C. Results of Control Reconnaissance on the Stillwater State Forest, Montana

Tables 8 to 15 show the results of control reconnaissance on the areas worked in the Stillwater State Forest.

Four species of Ribes were found, namely R. lacustre, R. viscosissimum, R. petiolare, and G. inermis. There was a large acreage of dense pole stands found to be Ribes free. Large amounts of R. lacustre and R. viscosissimum were found in the open pole stands. These two species and G. inermis were numerous in the open reproduction stands. All four species of Ribes occurred on stream types. Over half of the area supported Ribes growth in excess of 10 plants per acre.

D. Results of Control Reconnaissance on the Flathead National Forest, Montana.

Tables 16 to 21 show the results of control reconnaissance on the Flathead National Forest, Montana.

Only 2 species of Ribes were found, namely, R. lacustre and G. inermis. These were chiefly confined to the stream type. Nearly 82 % of the area reconnaissanced was dense mature, and supported an average of less than 4 Ribes per acre. Only 2.7 % of the entire area reconnaissanced had more than an average of 10 Ribes per acre.

E. Results of Control Reconnaissance on Missoula National Forest, (Northern Pacific Land), Montana.

Tables 22 to 28 show the results of the work on the Missoula National Forest, Montana.

There were 3 species of Ribes found, namely, R. lacustre, R. petiolare, and G. inermis. The first two were found confined to stream type, and G. inermis was found only in dense mature stands. Only 1.7 % of the area, or that along streams, supported Ribes growth in excess of 10 per acre.

Table No. 8

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Stillwater State Forest, Montana 1926

Erad. Types	White Pine Type - Age Classes										Non-White Pine Type - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	200+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	200+	Not Classified	Total
D. M.							776			776							3937		1265	5252
O. M.																				
D. P.																470	530		1987	2937
O. P.																			222	222
D. R.																				
C. R.									148	148	65									65
Stream							28			28							420		36	456
Brush																			306	306
Clearing																				
Not Classified																				
Totals							804		148	952	65					470	4937		4016	9288

Table No. 9

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana.

Erad. Types	Number of Ribes lacustre per Acre Classes 0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	Total
D. M.	1261	2985	1382	400																			6023
O. M.																							
D. P.	2987																						2987
O. P.															222								222
D. R.																							
O. R.	25	40														148							213
Stream	36					8	32	10	5		320					25	12	34					482
Brush	128										25					153							306
Total	4427	3025	1382	400		8	32	10	5		345				222	326	12	34					10238

Table No. 10

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana

Erad. Types	Number of Ribes viscosissimum per Acre Classes																						Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 251	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	2877	1195	1550	406																			6028
C. M.																							
D. P.	2987																						2987
O. P.																			222				222
D. R.																							
O. R.	65																			148			213
Stream	417		12	9	20	12					12												482
Brush	128								153									25					306
Total	6474	1195	1562	415	20	12			153		12							25	222	148			10238

Table No. 11

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana

Erad. Type	Number of Ribes petiolare per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 600	751 1000	1001 1500	
D. M.	6028																						6028
C. M.																							
D. P.	2987																						2987
C. P.	222																						222
D. R.																							
O. R.	213																						213
Stream	454	28																					482
Brush	306																						306
Total	10210	28																					10238

Table No. 12

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana.

Erad. Type	Number of G. inermis per Acre Classes 0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	Total
D. M.	2787	2029	700						512														6028
O. M.																							
D. P.	2987																						2987
O. P.	222																						222
D. R.																							
O. R.	148	40																				25	213
Stream	69		12						13				320				10	30	6	22			432
Brush	306																						306
Total	6519	2069	712						525				320				10	30	6	22		25	10238

Table No. 13

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Stillwater State Forest, Montana

Erad. Type	Number of All Ribes Per Acre Classes																						
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	175	1746	839	2756							512												6028
O. M.																							
D. P.	2987																						2987
O. P.																				222			222
D. R.																							
O. R.		40																			148	25	213
Stream													5	20		336	9	54	32	26			482
Brush	128																153			25			306
Total	3290	1786	839	2756							512		5	20		336	162	54	32	273	148	25	10238

Table No. 14

Distribution of Ribes by Species
Stillwater State Forest, Montana

Ribes Species	Percent of Total Acres reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	43.3 %	29.5 %	27.2 %
R. viscos.	63.2 %	11.7 %	25.1 %
R. petiol.	99.7 %	.3 %	---
R. inermis	63.7 %	20.2 %	16.1 %
All Ribes	32.1 %	17.4 %	50.5 %

Table No. 15

Number of Ribes per Acre by Ribes Species and Eradication Types
Stillwater State Forest, Montana.

Erad. Types	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	6028	7.6	6.5		9.8	23.9
O. M.						
D. P.	2987					
O. P.	222	187.0	450.0			637.0
D. R.						
O. R.	213	157.3	434.3		147.6	739.2
Stream	482	112.8	5.8	.3	155.0	273.9
Brush	306	120.3	66.1			136.4
Total & Averages	10238	20.7	24.9	.01	16.1	61.7

Table No. 16

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Flathead National Forest, Montana 1926.

Erad. Type	White Pine Type - Age Classes										Non-White Pine Type - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	200+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	200+	Not Classified	Total
D. M.							4400			4400							2690		390	3080
O. M.																			25	25
D. P.																				
C. P.																			40	40
D. R.																				
O. R.	50	120							335	505										
Stream							159			159										
Brush																			2551	2551
Clearing																			120	120
Not Classified																				
Totals	50	120					4559		335	5064							2690		3126	5816

Table No. 17

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Flathead National Forest, Montana.

Erad. Type	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
	Number of Ribes lacustre per Acre Classes																						
D. M.	2220	2410																					4630
O. M.	25																						25
D. P.																							
O. P.																							
D. R.																							
O. R.		505																					505
Stream	15			3		19					104	3	15										159
Brush	350																						350
Total	2610	2915		3		19					104	3	15										5669

Table No. 18

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Flathead National Forest, Montana.

Erad. Type	Number of G. inermis per Acre Classes 0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	3700	930																					4630
O. M.	25																						25
D. P.																							
O. P.																							
D. R.																							
O. R.	505																						505
Stream	127			20		7								5									159
Brush	350																						350
Total	4707	930		20		7								5									5669

Table No. 19

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Flathead National Forest, Montana.

Erad. Type	Number of All Ribes Per Acre Classes 0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	1290	3340																					4630
C. M.	25																						25
D. P.																							
O. P.																							
D. R.																							
O. R.		505																					505
Stream	10			3		2			10		111	3	5	15									159
Brush	350																						350
Total	1675	3845		3		2			10		111	3	5	15									5669

Table No. 20

Distribution of Ribes by Species
Flathead National Forest, Montana.

Ribes Species	Percent of Total Acres Reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	46.0 %	51.4 %	2.6 %
G. inermis	83.0 %	16.4 %	0.6 %
All Ribes	29.5 %	67.8 %	2.7 %

Table No. 21

Number of Ribes per Acre by Ribes Species and Eradication Types
Flathead National Forest, Montana.

Erad. Type	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	4630	2.6			1.0	3.6
O. M.	25					
D. P.						
O. P.						
D. R.						
O. R.	505	5.0				5.0
Stream	159	82.4			10.2	92.6
Brush	350					
Total & Averages	5669	4.9			1.1	6.0

Table No. 22

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Missoula National Forest, Montana, 1926 (N. P. Ry. Lands)

Erad. Types	White Pine Types - Age Classes										Non-White Pine Types - Age Classes									
	1-10	11-20	21-40	41-60	61-80	81-100	101-200	201+	Not Classified	Total	1-10	11-20	21-40	41-60	61-80	81-100	101-200	201+	Not Classified	Total
D. M.									895	895										
C. M.																				
D. P.																			363	363
O. P.																				
D. R.																				
O. R.																				
Stream									22	22										
Brush																				
Clearing																				
Not Classified																				
Totals									917	917									363	363

Table No. 23

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Missoula National Forest (N. P. Ry. Land) Montana.

Erad. Type	Number of Ribes lacustre per Acre Classes.																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	895																						895
O. M.																							
D. P.	363																						363
O. P.																							
D. R.																							
O. R.																							
Stream																10		12					22
Brush																							
Total	1258															10		12					1280

Table No. 24

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Missoula National Forest (N. P. Ry. Lands) Montana

Erad. Types	Number of R. petiolare per Acre Classes																					Totals
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	895																						895
O. M.																							
D. P.	363																						363
O. P.																							
D. R.																							
O. R.																							
Stream											12		10										22
Brush																							
Total	1258										12		10										1280

Table No. 25

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Missoula National Forest, (N. P. Ry. Lands) Montana

Erad. Type	Number of G. inermis per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	520	375																					895
O. M.																							
D. P.	363																						363
O. P.																							
D. R.																							
O. R.																							
Stream	22																						22
Brush																							
Total	905	375																					1280

Table No. 26

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes Per Acre Classes
Missoula National Forest (N. P. Ry. Land) Montana

Erad. Type	Number of Ribes (All Species) per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	520	375																					895
O. M.																							
D. P.	363																						363
O. P.																							
D. R.																							
O. R.																							
Stream																		10	12				22
Brush																							
Total	883	375																10	12				1280

Table No. 27

Distribution of Ribes by Species
Missoula National Forest (N.P.Ry.
lands)Montana.

Ribes Species	Percent of Total Acres Reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	98.3 %	0	1.7 %
R. petiola.	98.3 %	0	1.7 %
G. inermis	70.7 %	29.3 %	0
All Ribes	69.0 %	29.3 %	1.7 %

Table No. 28
Number of Ribes per Acre by Ribes Species and Eradication Types
Missoula National Forest (N. P. Ry. lands)Montana.

Erad. Type	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare.	G. inermis	All Ribes
D. M.	895				2.1	2.1
O. M.						
D. P.	363					
O. P.						
D. R.						
O. R.						
Stream	22	293.2		114.1		407.3
Brush						
Total & Averages	1280	5.0		2.0	1.5	8.5

F. Results of Control Reconnaissance on the Cabinet National Forest, Montana.

Tables 29 to 34 show results of the work on the Cabinet National Forest, Montana.

There were 2 species of Ribes found, namely, R. lacustre and G. inermis. These were confined to open mature and stream types. An average of less than 12 Ribes per acre was found on the stream type. Only 2.7% of the area reconnaissanced supported a Ribes growth in excess of 10 plants per acre.

G. Results of Control Reconnaissance on Lolo National Forest, Montana.

Tables 35 to 42 show the results of control reconnaissance on the Lolo National Forest, Montana.

Ribes were abundant and well distributed on the area reconnaissanced. There were found 4 species of Ribes, namely, R. lacustre, R. viscosissimum, R. petiolare, and G. inermis. R. lacustre was present in every eradication type. R. viscosissimum was confined to the dense and open mature types. R. petiolare was found only along streams. G. inermis was seen in the open reproduction and stream types. On 60.8 % of the area Ribes were found in excess of 10 plants per acre.

H. Summary of Results of all Reconnaissance Performed in Montana

Tables 43 to 51 show the results of all reconnaissance performed in Montana.

R. lacustre occurred in every eradication type. R. viscosissimum was found in every eradication type except the dense pole and dense reproduction types. R. petiolare was found confined to the stream type. G. inermis occurred in the dense mature, open mature, open reproduction, and stream types. Over 1/3 of the entire area reconnaissanced supported a Ribes growth of more than 10 Ribes per acre.

Table No. 51 is made up of preceding tables, and shows Ribes conditions by forests. It is apparent that there is a great variation in the number of Ribes per acre in the different forests, varying from an average of 1.4 Ribes per acre on the Cabinet National Forest, to 78.8 Ribes per acre on the Lolo National Forest.

R. lacustre and *G. inermis* occur on every one of the 6 forests. *R. viscosissimum* was found on the Stillwater State Forest, and Lolo National Forest. *R. petiolare* was seen on the Stillwater State Forest, Missoula National Forest, and Lolo National Forest.

The forests, namely the Stillwater State and Lolo National Forests, on which were found the greatest average number of Ribes per acre, also showed the highest percent of area on which there were found more than 10 Ribes per acre.

Table No. 29

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Cabinet National Forest, Montana 1926

Erad. Types	White Pine Type - Age Classes										Non-White Pine Type - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total
D. M.																	318			318
O. M.																			1278	1278
D. P.			2335							2335									470	470
O. P.			720							720										
D. R.																				
O. R.																				
Stream			317						2	319										
Brush																			160	160
Clearing																			160	160
Not Classified																				
Totals			3372						2	3374							318		2068	2386

Table No. 30

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Cabinet National Forest, Montana

Erad. Type	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.																							
O. M.	1158	438																					1596
D. P.	2885																						2885
O. P.	720																						720
D. R.																							
O. R.																							
Stream	67	250	2																				319
Brush	160																						160
Total	4990	688	2																				5630

(The column headings sit under the spanning heading "Number of Ribes lacustre per Acre Classes".)

Table No. 31

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Cabinet National Forest, Montana

Erad. Types	Number of G. inermis per Acre Classes																						Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.																							
O. M.	1158	438																					1596
D. P.	2885																						2885
O. P.	720																						720
D. R.																							
O. R.																							
Stream	167		150	2																			319
Brush	160																						160
Total	5090	438	150	2																			5680

Table No. 32

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Cabinet National Forest, Montana.

Erad. Type	Number of all Ribes per Acre Classes 0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.																							
O. M.	1158	438																					1596
D. P.	2835																						2835
O. P.	720																						720
D. R.																							
O. R.																							
Stream	65	100	2	152																			319
Brush	160																						160
Total	4938	528	2	152																			5680

Table No. 33

Distribution of Ribes by Species
Cabinet National Forest, Montana

Ribes Species	Percent of Total Acres reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	87.9 %	12.1 %	Trace (only 2 acres)
G. inermis	89.6 %	7.7 %	2.7 %
All Ribes	87.8 %	9.5 %	2.7 %

Table No. 34

Number of Ribes per Acre by Ribes Species and Eradication Types
Cabinet National Forest, Montana.

Erad. Type	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.						
O. M.	1596	1.4			1.4	2.8
D. P.	2885					
O. P.	720					
D. R.						
O. R.						
Stream	319	4.0			7.2	11.2
Brush	160					
Total & Averages	5680	.6			.8	1.4

Table No. 35

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
Lolo National Forest, Montana 1926

Erad. Type	White Pine Type - Age Classes										Non-White Pine Types - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total
D. M.							1795	1797		3592							305	2381	435	3121
O. M.								186		186								396		396
D. P.																	135		570	705
O. P.																			120	120
D. R.		760								760										
O. R.	2107	440								2547										
Stream	30	34					52	73	10	199										
Rock																				
Brush																				
Clearing																				
Not Classified																			1834	1834
Total	2137	1234					1847	2056	10	7284							440	2777	2959	6176

Table No. 36

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes Per Acre Classes
Lolo National Forest, Montana

Erad. Type	Number of Ribes lacustre per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	1326	425		475		340	240	207	260	365	360	1265	295		260								6318
O. M.	931	90	96																				1117
D. P.	945	333																					1278
O. P.	90															120							210
D. R.													335	240	185								760
O. R.	981										50	970	890			417		200					3508
Stream													23		37	17	28	74	12	8			199
Brush																							
Total	4773	848	96	475		340	240	207	260	365	410	2235	1543	240	482	554	28	274	12	8			13390

Table No. 37

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Lolo National Forest, Montana

Erad. Type	Number of Ribes viscosissimum per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	4032	2201	85																				6318
O. M.	535	582																					1117
D. P.	1278																						1278
O. P.	210																						210
D. R.	760																						760
O. R.	3508																						3508
Stream	199																						199
Brush																							
Total	10522	2783	85																				13390

Table No. 38

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Lolo National Forest, Montana

Erad. Type	Number of R. petiolare per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	6318																						6318
O. M.	1117																						1117
D. P.	1278																						1278
O. P.	210																						210
D. R.	760																						760
O. R.	3508																						3508
Stream											40	10	11		44	27	13	14	10	30			199
Brush																							
Total	13191										40	10	11		44	27	13	14	10	30			13390

Table No. 39

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Lolo National Forest, Montana

Erad. Types	Number of G. inermis per Acre Classes																						
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	Total
D. M.	6318																						6318
O. M.	1117																						1117
D. P.	1278																						1278
O. P.	210																						210
D. R.	760																						760
O. R.	3308			200																			3508
Stream	124			5	20	18	10				10		12										199
Brush																							
Total	13115			205	20	18	10				10		12										13390

Table No. 40

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
Lolo National Forest, Montana

Erad. Type	Number of All Ribes per Acre Classes																					Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	440	1451	425		390	360	240	207	260	365	360	1265	295		260								6318
O. M.	535	486		96																			1117
D. P.	945	333																					1278
O. P.	90															120							210
D. R.													335	240	185								760
O. R.	981										50	970	890			417		200					3508
Stream																		32	61	36	70		199
Brush																							
Total	2991	2270	425	96	390	360	240	207	260	365	410	2235	1520	240	445	537		232	61	36	70		13390

Table No. 41

Distribution of Ribes by Species
Lolo National Forest, Montana.

Ribes Species	Percent of total Acres Reconnaissanced which has		
	No. Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	35.7 %	6.3 %	52.0 %
R. viscos.	78.6 %	20.8 %	0.6 %
R. petiol.	98.5 %	----	1.5 %
G. inermis	97.2 %	----	2.8 %
All Ribes	22.3 %	16.9 %	60.8 %

Table No. 42

Number of Ribes per Acre by Ribes species and Eradication Types
Lolo National Forest, Montana.

Erad. Types	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	6318	58.8	1.9	---	---	60.7
O. M.	1117	1.7	2.6	---	---	4.3
D. P.	1278	1.3	---	---	---	1.3
O. P.	210	128.6	---	---	---	128.6
D. R.	768	157.0	---	---	---	157.0
O. R.	3508	113.8	---	---	1.4	115.2
Stream	199	291.0	---	263.5	24.0	578.5
Brush						
Total & Averages	13,390	73.1	1.1	3.9	.7	78.8

Table No. 43

Total Number of Acres Reconnaissanced
Classified According to Age Classes and Eradication Types
All Areas Worked, Montana, 1926.

Erad. Types	White Pine Type - Age Classes										Non-White Pine Types - Age Classes									
	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total	1-10	11 20	21 40	41 60	61 80	81 100	101 200	201+	Not Classified	Total
D. M.							8576	4052	895	13523							9020	3303	2340	15663
O. M.								136		136								396	1303	1699
D. P.			4010	290						4300			250	40		470	665		3723	5148
O. P.			720							720									382	382
D. R.		760								760		410								410
O. R.	2157	560							483	3200	65									65
Stream	30	34	327				298	124	34	847							425	5	36	466
Brush																			3017	3017
Clearing																			230	230
Not Classifi.																			1834	1834
Total	2187	1354	5057	290			8874	4362	1412	23536	65	410	250	40		470	10110	4204	13415	28964

Table No. 44

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
All Areas Worked, Montana.

Erad. Type	Number R. lacustre Per Acre Classes																						Total
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	
D. M.	9787	5820	1282	875		240	240	207	260	365	260	1265	295		260								21456
C. M.	2114	528	96																				2738
D. P.	7660	333																					7993
O. P.	810														222	120							1152
D. R.													335	240	185								760
O. R.	1006	545									50	970	890			565		200					4226
Stream	143	250	2	3		27	32	10	5		424	3	50	3	72	57	40	120	12	8			1261
Brush	638										25					153							816
Total	22158	7476	1430	878		367	272	217	265	365	859	2238	1570	243	739	895	40	320	12	8			40402

Table No. 45

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
All Areas Worked, Montana.

Erad. Type	Number Ribes viscosissimum per Acre Classes 0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	Total
D. M.	16019	3396	1635	406																			21456
O. M.	2156	582																					2738
D. P.	7993																						7993
O. P.	930																		222				1152
D. R.	760																						760
O. R.	4078																			148			4226
Stream	1196		12	9	20	12					12												1261
Brush	638								153									25					816
Total	33770	3978	1647	415	20	12			153		12							25	222	148			40402

Table No. 46

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes Per Acre Classes
All Areas Worked, Montana.

Erad. Type	Number of Ribes petiolare per Acre Classes 0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	21456																						21456
O. M.	2738																						2738
D. P.	7993																						7993
O. P.	1152																						1152
D. R.	760																						760
O. R.	4226																						4226
Stream	1012	28									52	10	21		44	27	13	14	10	30			1261
Brush	816																						816
Total	40153	28									52	10	21		44	27	13	14	10	30			40402

Table No. 47

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
All Areas Worked, Montana

Erad. Type	Number of G. inermis Per Acre Classes																					
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	16240	2904	700						512														21456
C. M.	2300	438																					2738
D. P.	7993																						7993
O. P.	1152																						1152
D. R.	760																						760
O. R.	3961	40		200																		25	4226
Stream	589		162	27	20	25	10		13		10		332	5			10	30	6	22			1261
Brush	816																						816
Total	33911	4382	862	227	20	25	10		525		10		332	5			10	30	6	22		25	40402

Table No. 48

Number of Acres Intensively Reconnaissanced
Classified According to Eradication Types and Number of Ribes per Acre Classes
All Areas Worked, Montana.

Erad. Types	Number All Ribes Per Acre Classes 0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	Total
D. M.	5440	7432	1264	2756	390	260	240	207	260	365	872	1265	295		260								21456
O. M.	1713	924		96																			2733
D. P.	7660	333																					7993
O. P.	810															120				222			1152
D. R.													335	240	185								760
C. R.	981	545									50	970	890			417		200			148	25	4226
Stream	100	100	2	155		2			10		111	3	22	33	35	241	9	96	105	62	70		1261
Brush	638																153			25			816
Total	17347	9384	1266	2007	390	362	240	207	270	365	1033	2238	1542	273	480	878	162	296	105	309	218	25	40402

Table No.49

Distribution of Ribes by Species
All Areas Reconnaissanced, Montana

Ribes Species	Percent of total Acres Reconnaissanced which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	54.8 %	18.5 %	26.7 %
R. viscos.	83.6 %	9.8 %	6.6 %
R. petiol.	99.4 %	.1 %	.5 %
G. inermis	83.9 %	10.8 %	5.3 %
All Ribes	42.9 %	23.2 %	33.9 %

Table No. 50

Number of Ribes per Acre by Ribes Species and Eradication Types
All Areas Reconnaissanced, Montana

Erad. Types	Acres Reconn.	Number of Ribes by Species per Acre				
		R. lacustre	R. viscos.	R. petiolare	G. inermis	All Ribes
D. M.	21456	20.0	2.4		3.2	25.6
O. M.	2738	1.5	1.1		.8	3.4
D. P.	7993	.2				.2
O. P.	1152	59.5	86.7			146.2
D. R.	760	157.0				157.0
O. R.	4226	103.0	21.9		8.6	133.5
Stream	1261	113.4	2.2	43.7	66.1	225.4
Brush	816	45.1	24.8			69.9
Total & Averages	40402	30.6	6.7	1.4	4.7	43.4

Table No. 51

Comparison of Ribes Data by Forests, Montana

Forest	Acres Intensively Reconn.	% of Total Acres Reconn. which has No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre	Average No. of Ribes by Species per Acre. R. lac.	R. viscos.	R. pet.	G. inermis	Total Ribes
Kootenai Nat'l Forest	4145	84.9%	13.8 %	1.3 %	2.4			.7	3.1
Stillwater State Forest	10238	32.1 %	17.4 %	50.5 %	20.7	24.9	.01	16.1	61.7
Flathead Nat'l Forest	5669	29.5 %	67.8 %	2.7 %	4.9			1.1	6.0
Missoula Nat'l Forest (N.P. Ry land)	1280	69.0 %	29.3 %	1.7 %	5.0		2.0	1.5	8.5
Cabinet Nat'l Forest	5680	87.8 %	9.5 %	2.7 %	.6			.8	1.4
Lolo National Forest	13390	22.3 %	16.9 %	60.8 %	73.1	1.1	3.9	.7	73.8
All Areas	40402	42.9 %	23.2 %	33.9 %	30.6	6.7	1.4	4.7	43.4

V. Costs of Control Reconnaissance - Montana, 1926.

Table No. 52 shows the cost of the work done in Montana.

Table No. 52

Costs of Control Reconnaissance, Montana July 1 to September 11,1926.

Name	Salary	Sub-sistence	Personally Owned Auto	Equip-ment	Freight	Total
Johnson, C.H.	532.50	144.75	52.15			729.40
Skeels, Dorr	591.67	111.05	180.67			883.39
Misc. vouchers				18.22	1.63	19.85
Total	$1124.17	$255.80	$232.82	$18.22	$1.63	$1632.64

The expense of personally owned auto and subsistence for Skeels are those for July and August only. His expense account for September had not been sent in at the time this report was written.

$$\frac{\text{Total Cost} \quad \$1632.64}{\text{Total Sections worked} \quad 83} = \$19.67 \text{ cost per section}$$

$$\frac{\text{Total Cost} \quad \$1632.64}{\text{Total Acres Reconn.} \quad 52{,}500} = \$\ .031 \text{ cost per acre}$$

$$\frac{\text{Total Cost} \quad \$1632.64}{\text{Total Man Days} \quad 146} = \$11.18 \text{ cost per man day}$$

$$\frac{\text{Total Acres Worked} \quad 52{,}500}{\text{Total Man days} \quad 146} = 360 \text{ acres per man day}$$

VI. Permanent Control Reconnaissance Records

The information and maps obtained on control reconnaissance have been put into uniform, permanent forms similar to the permanent records of reconnaissance performed in Idaho. A description of the methods used in making such permanent records is given in this year's annual report on "Control Reconnaissance, Federal Lands, Idaho."

SCOUTING FOR THE DISEASE, NORTHWESTERN MONTANA

By

C. H. Johnson
Assistant Pathologist

Scouting was conducted in Northwestern Montana along the principal drainages and in such places where the occurrence of blister rust might be detected. As yet no evidence of the rust has been found in this state. The following table shows the result of this scouting.

Scouting for the Disease, Northwestern Montana
September, 1926.

Locality	Ribes Inspected					
	R. nigrum	R. petiolare	R. lacustre	G. inermis	G. setosa	All Ribes
Yaak River and Tributaries		100	360	40		500
Bull River		50	210	82		342
Thompson River and Clarks Fork		360	140	90		590
Black foot Riv. Missoula River & Tributaries	100	560	160	80	200	1100
Flathead and Swan Lakes	25	630	312	240		1207
Stillwater River		62	800	160		1022
Kootenai River	5	56	561	220		842
Totals	130	1818	2543	912	200	5603

Blister rust exhibits were shown at the State Fair at Helena, Montana and western Montana Fair at Missoula.

BLISTER RUST CONTROL WORK IN IDAHO
1926

Blister rust control work in Idaho during the past year has been organized under a number of different projects, namely: cultivated black currant eradication, experimental Ribes eradication, control reconnaissance on Federal lands, cooperative demonstration on private timber lands, experimental chemical eradication, ecological studies, educational work and scouting for the disease.

The first of the above mentioned projects was supervised by Mr. A. W. B. Kjosness, Commissioner of Agriculture for the State of Idaho. All other projects were directly supervised from the Spokane office. The following is the memorandum of understanding under the terms of which the work in Idaho has been organized:

MEMORANDUM OF UNDERSTANDING BETWEEN THE IDAHO STATE DEPARTMENT OF AGRICULTURE, THE UNIVERSITY OF IDAHO, THE STATE BOARD OF FORESTRY, THE POTLATCH TIMBER PROTECTIVE ASSOCIATION, THE CLEARWATER TIMBER PROTECTIVE ASSOCIATION, THE COEUR D'ALENE TIMBER PROTECTIVE ASSOCIATION, THE PEND OREILLE TIMBER PROTECTIVE ASSOCIATION, THE PRIEST LAKE TIMBER PROTECTIVE ASSOCIATION AND THE BUREAU OF PLANT INDUSTRY OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN IDAHO.

EFFECTIVE JULY 1, 1926 to JUNE 30, 1927.

For the purpose of effectively controlling the white pine blister rust in Idaho, the several cooperating agencies shall participate in a joint program as indicated below.

1. The Bureau of Plant Industry shall employ and direct the work of one or more men who shall assist in prosecuting the following cooperative activities: eliminating the cultivated black currant (*Ribes nigrum*) from the State by systematically locating and securing the destruction of these plants; inspecting plant shipments, in cooperation with the Federal Horticultural Board, at strategic terminal and transfer points to detect and prevent violations of State and Federal blister rust quarantines; scouting to determine the presence of the disease in the State; performing control reconnaissance; conducting experiments and demonstrations in local control methods. The Bureau of Plant Industry is responsible for the proficiency of its employees assigned to duties under the terms of this agreement, and in addition agrees to provide the necessary technical information regarding the disease to such employees of the other cooperating agencies that are assigned to work contemplated in this agreement.

BLISTER RUST CONTROL WORK IN IDAHO
1926

Blister rust control work in Idaho during the past year has been organized under a number of different projects, namely: cultivated black currant eradication, experimental Ribes eradication, control reconnaissance on Federal lands, cooperative demonstration on private timber lands, experimental chemical eradication, ecological studies, educational work and scouting for the disease.

The first of the above mentioned projects was supervised by Mr. A. W. E. Kjosness, Commissioner of Agriculture for the State of Idaho. All other projects were directly supervised from the Spokane office. The following is the memorandum of understanding under the terms of which the work in Idaho has been organized:

MEMORANDUM OF UNDERSTANDING BETWEEN THE IDAHO STATE DEPARTMENT OF AGRICULTURE, THE UNIVERSITY OF IDAHO, THE STATE BOARD OF FORESTRY, THE POTLATCH TIMBER PROTECTIVE ASSOCIATION, THE CLEARWATER TIMBER PROTECTIVE ASSOCIATION, THE COEUR D'ALENE TIMBER PROTECTIVE ASSOCIATION, THE PEND OREILLE TIMBER PROTECTIVE ASSOCIATION, THE PRIEST LAKE TIMBER PROTECTIVE ASSOCIATION AND THE BUREAU OF PLANT INDUSTRY OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN IDAHO.

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2. The Idaho State Department of Agriculture shall employ one or more men who shall assist in eliminating the cultivated black currant from the State by systematically locating and securing the destruction of these plants; inspect plant shipments, in cooperation with the Federal Horticultural Board and Bureau of Plant Industry, to detect and prevent violations of State and Federal blister rust quarantines; scout for blister rust; and inspect nurseries in the state growing currants, gooseberries or white pines.

3. The Idaho State Board of Forestry shall cooperate through its deputized agents, in so far as their other duties will permit, in systematically locating cultivated black currants, scouting for blister rust and locating infected or potentially infected host plants. It shall also cooperate directly in so far as it is able and as the necessity arises in promoting and assisting in the various blister rust control activities carried on in the state.

4. The University of Idaho, through the several departments here enumerated, agrees to cooperate as follows: The School of Forestry, University of Idaho, agrees to detail one member of its staff to cooperative white pine blister rust control work throughout the field season and to allow him sufficient time during the remainder of the year to generally supervise such work in Idaho. Furthermore the School of Forestry, University of Idaho, agrees to continue to study on the rate of growth of western white pine remaining on areas after logging and a study to determine expected yields of second growth white pine stands. The Department of Plant Pathology of the University of Idaho Agricultural Experiment Station agrees to examine all specimens suspected of being infected with the white pine blister rust when sent in by the field scouts and others, and to keep the necessary records of such collections. It is also agreed that all specimens which are suspected of being infected with the blister rust shall be submitted to the United States Bureau of Plant Industry for final determination. The Extension Division of the University of Idaho College of Agriculture shall use its regular employees, in so far as their other duties may permit, in locating cultivated black currants and other infected or potentially infected blister rust host plants, and in giving publicity to the campaign to eradicate black currants and to other means of preventing the introduction and spread of white pine blister rust in Idaho.

5. The Potlatch Timber Protective Association, the Clearwater Timber Protective Association, the Coeur d'Alene Timber Protective Association, the Pend Oreille Timber Protective Association, and the Priest Lake Timber Protective Association shall cooperate by contributing the services of their employees, in so far as their other duties will permit, to assist in systematically locating cultivated black currants, scouting for the rust within the boundaries of their respective associations, and in general investigations to secure complete information concerning the age and amount of white pine second growth

2. The Idaho State Department of Agriculture shall employ one or more men who shall assist in eliminating the cultivated black currant from the State by systematically locating and securing the destruction of these plants; inspect plant shipments, in cooperation with the Federal Horticultural Board and Bureau of Plant Industry, to detect and prevent violations of State and Federal blister rust quarantines; scout for blister rust; and inspect nurseries in the state growing currants, gooseberries or white pines.

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on logged-off and burned-over lands within the boundaries of their respective associations; and to determine by field surveys the number and kinds of currants and gooseberries in timbered, logged-off and burned-over lands, as a basis of determining the cost and feasibility of local control of blister rust on these lands.

6. All official records showing work performed under this agreement shall be open to inspection by any or all parties to the agreement. All findings of the blister rust made by any party to this agreement shall be promptly reported to the other parties. All specimens collected or received by any party to this agreement which are suspected to be infected with blister rust shall be submitted to the Department of Plant Pathology, University of Idaho, for critical determination.

7. It is provided that from July 1, 1926, to June 30, 1927, the Idaho State Department of Agriculture shall expend about $2000.00, the University of Idaho about $4000.00, the Clearwater Timber Protective Association about $3,300.00, the Coeur d'Alene Timber Protective Association about $4,100.00, the Potlatch Timber Protective Association about $3,800.00, the Pend Oreille Timber Protective Association about $3,800.00, and the Bureau of Plant Industry about $34,600.00, in the course of this work. All expenditures made by the Bureau of Plant Industry, shall be in accordance with the fiscal regulations of the United States Department of Agriculture.

8. This memorandum of understanding shall take effect July 1, 1926 and continue in force until June 30, 1927, or until previously terminated by mutual consent of the parties concerned.

Date	Signature
Nov. 15, 1926	(s) A. W. B. Kjosness, Commissioner Idaho State Department of Agriculture
March 10, 1927	(s) F. G. Miller, Dean, School of Forestry University of Idaho
March 15, 1927	(s) Ben E. Bush State Board of Forestry.
March 15, 1927	(s) A. W. Laird, President Potlatch Timber Protective Association
March 15, 1927	(s) Theo Fohl Clearwater Timber Protective Association

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(s) Theo Fohl Clearwater Timber Protective Association	March 15, 1927

Date (Cont.)	Signature (Cont.)
March 15, 1927	(s) Sig Hofslund Coeur d'Alene Timber Protective Association.
March 14, 1927	(s) T. L. Greer Pend Oreille Timber Protective Association
3/19/27	(s) J. Jensen Priest Lake Timber Protective Association
	Bureau of Plant Industry, U. S. Department of Agriculture.

REPORT ON BLACK CURRANT ERADICATION WORK IN IDAHO.

by
C. R. Stillinger
Associate Pathologist

* * *

The eradication of the black currant in Idaho during the summer of 1926 was carried out as a cooperative project between the Bureau of Plant Industry, United States Department of Agriculture and the Idaho State Department of Agriculture. This project has been executed on a dollar for dollar basis of expenditure as provided for in paragraph one of the Memorandum of Understanding for the period of July 1, 1925 to June 30, 1926, and paragraph two of the Memorandum of Understanding for the period of July 1, 1926 to June 30, 1927.

Object of the Project

The object of the project has been to continue the thorough eradication of the cultivated black currant in that portion of Idaho remaining to be worked.

Personnel

Three two-man crews, each with a Ford car, made up the personnel. Messrs. Robertson, Haga, Crouch, Callender, Stewart, and Patch were the individuals employed. Mr. Patch was in charge of the work in the field. The work was supervised by the Idaho State Department of Agriculture, Boise, Idaho.

Division of Expense

The following division of the expense was made for the period of the work in the field, June 7 to September 1, 1926:

The Bureau of Plant Industry, United States Department of Agriculture paid the following:

(1) Salary for four men.
(2) Field expenses for six men.
(3) Expense for the gas and oil for the cars.

The Idaho State Department of Agriculture paid the following:

(1) Salary for two men.
(2) Furnished three Ford cars.
(3) Reimbursed the owners of the cultivated black currants for their bushes.

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The following tables give the budgets and moneys expended on this project for the summer of 1926.

Table No. I.

Funds Expended

	U. S. Department of Agriculture		Idaho State Department of Agriculture	
	June	July-August	June	July-August
Salary	320	840	200	400
Expense	481.25	1462.34	0	0
Reimbursement to C.B.C. Owners	0.0	0.0	0	308.55
Total	801.25	2302.34	200	*708.55

*This does not include any allowance for the cars which were owned by the State.

Table No. II.

Balance

	U. S. Department of Agriculture		Idaho State Department of Agriculture	
	June	July-August	June	July - August
Fund Available	1046.23	2090	?	?
Expense	801.25	2302.34	200	708.55
Balance	244.98	-212.34	?	?

Territory Worked

The work was completed in the following counties or portions thereof:

Payette County - Completed.
Canyon " - 9/10 done. Other part completed last year.
Owyhee " - 1/3 done. Other part completed last year.
Jefferson " - Completed.
Madison " - 9/10 done. Rest uncompleted.
Bonneville " - 1/2 done. Rest uncompleted.
Bingham " - Completed.
Power " - Completed.
Bannock " - 2/3 done. Rest uncompleted.
Fremont " - County worked before. One planting found near Fremont-Madison county line.

The following counties or portions thereof remain to be done:

Madison - 1/10
Teton - All
Bonneville - 1/2
Caribou - All
Bannock - 1/3
Bear Lake - All
Franklin - All
Oneida - All

From the number of plantings found in the counties adjoining these, it is fairly safe to estimate that a full three months working period with three two-man crews will be required to finish the work.

Results

The following table gives the results of the work according to counties, number of plantings, plants, and costs for reimbursement.

Table No. III.

County	Number Plantings	Number Plants	Cost per Bush $.00		$.25		$.35		$.40		$.50		Total Cost
			Plantings	Plants	Plantings	Plants	Plantings	Plants	Plantings	Plants	Plantings	Plants	
Canyon	28	118	22	98	2	7					4	13	$ 8.25
Payette	5	26	2	18							3	8	4.00
Bannock	50	611	44	480	2	94					4	37	42.00
Bingham	222	2284	209	2123	3	41	2	20			8	100	67.25
Bonneville	141	1345	133	1151	1	11			1	77	6	106	86.55
Jefferson	60	605	59	588							1	17	8.50
Power	14	207	11	175	1	8					2	24	14.00
Fremont	1	11	1	11									.00
Madison	117	1353	110	1197							7	156	78.00
Total	638	6560	591	5841	9	161	2	20	1	77	35	461	$308.55

The following table gives some idea of the size of the plantings which were eradicated during this last summer.

Table No. IV.

No. bushes in plant-ing	No. plant-ings	No. bushes in plant-ing	No. plant-ings	No. bushes in plant-ing	No. plant-ings	No. bushes in plant-ing	No. plant-ings	No. bushes in plant-ing	No. plant-ings
1	47	12	17	23	3	34	2	54	2
2	66	13	13	24	5	35	4	56	1
3	72	14	15	25	2	37	2	60	2
4	64	15	18	26	2	38	2	61	1
5	42	16	12	27	5	41	3	62	1
6	32	17	7	28	2	43	1	68	1
7	33	18	8	29	1	44	1	74	1
8	31	19	7	30	2	45	1	76	1
9	30	20	3	31	4	47	1	77	1
10	28	21	3	32	3	51	1	87	1
11	21	22	6	33	2	53	1	103	1
Total									638

FIELD REPORT OF THE WORK DONE BY METHODS CREWS AT BLISTER RUST CAMPS 2 and 3

Priest River, Idaho.
June 17, 1926 - September 4, 1926.
by

William C. Thompson,
Field Assistant.

* *

Introduction

This report summarizes the field work of the methods crews at Blister Rust Camps 2 and 3, Priest River, Idaho, for the 1926 season. It contains field procedure, details of Ribes eradication experiments and general tabulations of the results, which should be useful when the field notes are reworked later. Data to show the efficiency of Ribes eradication is recorded. A complete analysis of the methods study notes can not be made until the eradication crews final 1926 reports supply figures for the number of Ribes pulled per block and per type.

Purpose of Methods Work

The purpose of methods work in blister rust control is three fold: (1) to check crew Ribes eradication efficiency, (2) to improve the present methods of eradication, and (3) to collect the necessary field data to furnish quantitative evidence as proof of the superiority of certain Ribes eradication methods.

Itinerary and Personnel

The methods work at Blister Rust Camp 1 was in charge of P. S. Simcoe and that at Camps 2 and 3 was in charge of W. C. Thompson. A brief diary of the season follows:

June 17, P. S. Simcoe and W. C. Thompson went from Spokane to Camp 1.
June 21, C. R. Fullerton, C. Guptill, H. B. Mathany, F. Simcoe, H. E. Swanson and R. Young reported for methods work at Camp 1.
June 22-25, training the methods crew at Camp 1, working two advance and two strip checks. Performing laying trail experiment.
June 25, W. C. Thompson, H. E. Swanson, and R. Young moved to Camp 2 on Binarch Creek.
July 1, H. W. Swanson began methods work at Camp 3 with R. E. Hungate as assistant.
July 6, Leo Zon began methods work at Camp 2.
July 13, Camp 3 crews left to fight forest fires in the Upper Priest country. Camp 2 crews departed for the Larsen fire in the evening.
August 15, Camp 3 crews returned from fire fighting.
August 16, Camp 2 crews returned from fire fighting.
September 1, R. E. Hungate resigned to resume his teaching duties at Sprague, Wn. H. E. Swanson moved to Camp 2. P. S. Simcoe, F. Simcoe and C. R. Fullerton moved to Camp 2. September 4, W. C. Thompson went to Spokane. Simcoe took charge of the combined crews at Camp 2.

It will be noticed that the methods men were divided into camps: P. S. Simcoe, F. Simcoe, H. B. Mathany, C. R. Fullerton, and C. Guptill at Camp 1; W. C. Thompson, R. Young, and L. Zon at Camp 2; and H. E. Swanson and R. E. Hungate at Camp 3. This division of forces made it frequently.

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necessary to use the regular eradication crews work as part of experiments.

The salary scale for Camps 2 and 3 methods men was as follows: Thompson $180 per month, Swanson $95, Young $80, Hungate $70, Zon $70.

Description of Area

Blister Rust Camp 2 crew, under the direction of B. A. Anderson, eradicated about 3300 acres in the lower drainage of Binarch Creek. Stream type with from 198 to 1904 Ribes per acre and open pole type with from 2 to 768 Ribes per acre prevailed. The valley and its emerging draws were relatively narrow and the slopes were steep. The north exposures of the hills were entirely wooded in contrast to the open pole type of the south exposures, which were covered in places with rocks, low shrubs, and grass. *Ribes viscosissimum* occurred on the north slopes but the south ones were practically Ribes free (less than 10 bushes per acre or less than 40' live stem per acre - arbitrary unit). C. Strong stated that the ecological factor in this case was probably moisture, rather than frost, lack of seeds, or soil constituents. In the late spring he found snow on the north side and dust on the south side of the ridges. *Ribes lacustre* and *Ribes inerme* were abundant in the stream type. The upper Binarch Creek valley has some of the best white pine stands (100% pure and of middle age classes) in the Kaniksu National Forest. The Ribes should be eliminated from that district in the immediate future.

Blister Rust Camp 3 crew, under the direction of William Guernsey, eradicated Ribes in the lower Lamb Creek drainage just north of the Binarch Creek area. In it was an extensive flat region of sandy soil with lodgepole pine which was Ribes free. For a chain on each side of Lamb Creek in the stream type, *Ribes inerme* were found at the rate of about 500 bushes per acre. In part of this type the Ribes were burned off to the ground in April 1926. By July many of the crowns had vigorous sprouts. This would make a good plot for ecological study. About one third of the Camp 3 area is a slope with a northeast exposure and open pole type which had about 500 *Ribes viscosissimum* per acre.

The eradication men have drawn maps of the respective areas and their report will include the following data which will be useful to methods study: acreage, number and species of eradicated Ribes, and the time of eradication. All of these will be arranged by block and type. The checking data of this report can very easily be applied to the general data of the whole type. B. A. Anderson drew a map of his area at Camp 3 and located on it all of the methods crew plots with numbers corresponding to those in the field notes.

Crew Methods

In an extensive area of similar type conditions an 8-man eradication crew was useful in the 6-2 formation. The interval between the men in line depended upon the Ribes concentration and upon the density of the undergrowth, but was about 10 feet on the average. Small pieces of magazine paper which were strewn on the ground by the end man of the front eradication line, marked the boundary of the strips in systematic eradication. The Ribes were pulled by hand. In narrow draws and stream bottoms

necessary to use the regular eradication crews' work as part of experiments.

The salary scale for Camps 2 and 3 Ribes men was as follows: Thompson $150 per month, Swanson $95, Young $85, Hughes $75, Cox $75.

Description of Area

Blister Rust Camp 2 crew, under the direction of S. N. Anderson, eradicated about 3360 acres in the lower drainage of Bitterroot Creek. Stream type with from 150 to 1500 Ribes per acre and open pole type with from 2 to 708 Ribes per acre prevailed. The valley and its emerging areas were relatively narrow and the slopes were steep. The north exposures of the hills were entirely wooded in contrast to the open pole type of the south exposures, which were covered in places with rocks, low shrubs, and grass. Ribes viscosissimum occurred on the north slopes but the south slopes were practically Ribes free (less than 10 bushes per acre or less than 30' live stem per acre - arbitrary unit). C. Strong states that the ecological factor in this case was probably moisture, rather than frost, lack of seeds, or soil conditions. In the late spring he found snow on the north side and dust on the south side of the ridges. Ribes lacustre and Ribes inerme were abundant in the stream type. The upper Bitterroot Creek valley has some of the best white pine stands (100 acres and of similar age classes) in the Kaniksu National Forest. The Ribes should be eliminated from that district in the immediate future.

Blister Rust Camp 3 crew, under the direction of William Burnaby, eradicated Ribes in the lower Lamb Creek drainage just north of the Bitterroot Creek area. In it was an extensive flat region of sandy soil with lodgepole pine which was Ribes free. Along a chain on each side of Lamb Creek in the stream type, Ribes inerme were found at the rate of about 300 bushes per acre. In part of this type the Ribes were burned off to the ground in April 1925 but many of the crowns had vigorous sprouts. This would make a good plot for ecological study. About one third of the Camp 3 area is a ridge with a northwest exposure and open pole type which had about 200 Ribes viscosissimum per acre.

The eradication men have drawn maps of the respective areas and their report will include the following data which will be useful to methods study: acreage, number and species of eradicated Ribes, and the time of eradication. All of these will be arranged by block and type. The checking data of this report can very easily be applied to the general data of the whole type. S. N. Anderson drew a map of his area at Camp 2 and located on it all of the methods crew plots with numbers corresponding to those in the field notes.

Crew Methods

In an extensive area of similar type conditions an 8-man eradication crew was used in the 8-C formation. The interval between the men in line depended upon the Ribes concentration and upon the density of the undergrowth, but was about 10 feet on the average. Small pieces of magazine paper which were strewn on the ground by the end man of the front eradication line, marked the boundary of the strips in system 4 of eradication. The Ribes were pulled by hand. In narrow types and stream sections

a four or five man crew with a foreman behind the line was used. Hillsides were usually worked up and down the slopes. At Camp 3, because the efficiency of the crew on the down slope was so poor, the strips were worked up the hill and along the contour instead.

Since a large percentage of the area worked this season might be classified as almost Ribes free, there was much work for the scouts and the scout crews. Several scout eradication methods were in use. At Camp 2 the scout (camp boss) went over the ground first to see what the Ribes conditions in general were. Ribes were found in the draws but in decreasing numbers up the hill therefrom. The scout kept a four-man crew busy in the draws while he himself pulled Ribes farther up the slopes where the concentration of Ribes had "run out". The area eliminated by the scout as Ribes free was not worked. Camp 3 method was as follows: Two scouts went over the area in strips about 5 chains apart to determine the places where the number of Ribes present justified crew eradication. A four or five-man crew was put to work in the "patches" of Ribes as soon as they were located. P. S. Simcoe is trying out scout crew methods on 75 acres at Camp 2 now.

The eradication crews went to work in the morning on the government time and returned to camp in the evening on their own time.

The numbers of pulled Ribes were reported to the foreman by the men at the end of each strip. The same inaccuracy of count due to split bushes was evident this season as in other years. Here are some of the figures for the number of bushes, which were taken from the advance check plots:

Table No. I.

Camp No.	Methods count	Eradication Report
2	532	189
	768	2886
	170	703
	220	372
	668	1465
	543	1009
	198	582
	456	56
3	717	670
	75	62
	624	840

The error is large, sometimes positive and sometimes negative. Instead of the errors just balancing one another, the eradication report seems to be too high. Here is a possible solution to the problem if its performance does not slow up the eradication. The crew men will notify the foreman each time the tenth Ribes has been pulled and the foreman will keep track of each ten as a unit on a tally register. This method should give more accurate eradication reports and therefore more accurate strip check figures.

The Daily Crew Record (Form 8-4432; BR 28) is not carried by the foreman into the field, but is kept neat for a permanent office record. For a while the foreman kept the number of Ribes pulled by the men on a scrap of paper in an unsystematic manner and then in the evening he filled in the Daily Crew Record notebook. I suggested the use of field notebook 8-299, ruled as shown in the accompanying sample, to be used instead of the scrap of paper. This form arranges the eradication data by block, strip, and type, which is a valuable aid in checking later. It was used in the field at Camp 2 during the 1926 season with satisfactory results.

Sample

Date - 9-1-26

Foreman - A. Quine
Ass't. Foreman - C. Adams
Locality - Camp 2, Block 2

Name	Strip 1, Type OR			Strip 2, Type DR			Strip 2, Type OR			Strip 3, Type OR			Total
	R. lac.	R. vis.	G. iner.	R. lac.	R. vis.	G. iner.	R. lac.	R. vis.	G. iner.	R. lac.	R. vis.	G. iner.	
A. Quine	25	1	0	7	2	0	9	2	2	27	4	0	79
C. Adams	20	0	0	10	2	1	11	4	0	32	3	0	83
B. Rogoway	16	2	0	10	3	0	13	19	3	30	0	1	97
C. Bernard	28	0	0	4	0	0	27	27	0	25	3	0	114
M. Deters	30	4	0	15	4	2	9	30	0	19	1	0	114
Total Ribes	119	7	0	46	11	3	69	82	5	133	11	1	487
Acreage	1.2			0.5			0.5			1.0			3.2
Crew Hours	2.0			3.5			1.0			1.5			

Checking

One of the duties of the methods organization was to check the efficiency of Ribes eradication. Two kinds of checks were used at Camps 2 and 3, the advance plot and the strip checks.

The advance check plots were small areas, located in many parts of the block in order to be representative, which were gone over by the methods crew before eradication. The following data were obtained in this preliminary check; the number, height, live stem, and species of the Ribes present. After the eradication crew had worked over the plot, a final check of the missed bushes on it was made by the methods crew. The success of this kind of a check depended upon how typical the plots were of the whole block. One-tenth-acre plots were too small; 0.5 acres in a long plot was better; and a complete strip across the block was best. Advance check plots were marked in several ways; by natural boundaries as streams, by small blazes on trees, by using a crew strip boundary as a base line for the plot, and by using paper or string marked strips (when the trails were laid in advance of the crews.)

Following is a tabulated result of the advance checks which were made at Camps 2 and 3 this season:

Table No. II

Summary of the Advance Checks
Camps 2 and 3.

Camp No.	Block	Type	Acreage Checked	Difficulty of Working	Preliminary Ribes Count per A.	Ribes Eradicated per A.	Ribes Missed per A.	L. S. Missed per A.	Efficiency Based on No. of Ribes	Efficiency Based on Feet L.S.	Man Hours to Eradicate per A.
2	1	OR	0.50	15	532.0	189.0	16.0	46.0	97.0	99.0	11.2
2	1	OP	0.37	34	768.0	2886.0	51.0	150.0	93.4	97.9	64.8
2	1	OP	0.60	27	170.0	703.0	2.1	51.7	88.0	92.3	32.7
2	2	OP	0.50	13	456.0	56.0	36.0	220.0	92.1	90.1	5.0
3	2	OP	0.40	11	717.0	670.0	47.5	78.7	93.4	96.0	18.7
3	2	OP	1.50	13	75.3	62.6	26.0	60.3	74.3	78.4	10.4
2	1	S	0.20	21	222.0	972.0	30.0	132.5	88.0	97.6	45.0
2	3	S	0.40	26	688.0	1465.0	72.5	255.0	90.4	95.4	20.9
2	3	S	0.70	26	543.0	1009.0	78.5	79.0	86.0	94.8	7.3
2	3	S	1.10	26	198.2	581.8	10.0	63.2	95.7	96.4	11.9
3	1	S	0.25	3	624.0	840.0	12.0	12.0	98.1	99.5	

The second kind of check used was the strip check. It was essentially the same as an advance check except that there was no preliminary check before eradication. The accuracy of the strip check depended upon the exactness of the eradication crew Ribes count and the estimated acreage. The strip plots varied in width from 1/4 to 1/2 chains and ran diagonally across the contour of the block at intervals of 12.5 chains, where the topography permitted. At least 2% of the total area of the block was checked to determine the missed Ribes and the missed live stem.

Following is a summary of the strip checks made during the 1926 season at Camps 2 and 3:

Table No. III.

Summary of Strip Checks
Camps 2 and 3.

Camp No.	Block	Type	Acreage Checked	Difficulty of Working	Ribes Eradicated per A.	Ribes Missed per A.	L. S. Missed per A. Ft.	Efficiency Based on Number of Ribes (%)	Man Hours to Eradicate per A.
2	1	OR	0.50	13	48.0	4.0	13.0	92%	8.5
2	1	DR	1.50	21	732.0	22.2	40.5	96	31.1
3	1	DR	1.60	23	20.0	19.0	86.8	41	1.7
2	1	OP	2.30	16	23.0	5.6	15.0	80	4.8
2	1	OP	0.36	34	163.0	33.0	77.7	81	16.6
2	1	OP	3.00	26	2.5	4.0	18.0	55	0.3
2	2	OP	9.00	31	31.5	2.0	12.0	94	1.1
2	2	OP	3.88	24	85.9	8.5	55.0	91	7.3
3	2	OP	1.00	11	1327.0	10.0	24.5	99	20.0
3	2	OP	1.00	19	231.0	48.0	48.0	92	6.0
3	2	OP	2.35	14	1169.0	45.0	73.8	96	13.8
3	2	OP	1.00	21	569.0	70.0	199.0	89	15.0
3	2	OP	2.20	25	553.0	23.0	69.3	96	12.0
3	2	OP	1.35	17	393.0	33.0	111.5	92	10.4
3	1	OP	3.20	13	222.0	4.0	21.4	98	7.9
3	1	OP	0.40	5	56.0	0.0	0.0	100	1.4
2	3	S	6.80	26	1234.0	245.0	129.0	97	22.6
2	3	S	3.00	26	1804.0	45.0	143.0	98	34.6
2	3	S	10.30	26	912.0	26.0	93.0	97	16.2
2	3	S	4.40	26	529.0	28.0	126.0	95	11.1
2	3	S	1.20	26	365.0	27.0	49.0	93	26.6
2	3	S	0.90	26	410.0	11.0	23.0	97	7.2
2	1	S	0.75	14	244.0	16.0	68.0	94	18.0
2	1	S	0.50	19	972.0	38.0	453.0	96	45.0
3	1	S	1.00	13	444.0	17.0	135.0	96	15.0
3	1	S	1.50	10	368.0	31.0	155.3	92	7.2
3	1	S	0.40	12	61.0	63.0	181.0	49	4.0

Forms WF-22BRC-5-22-26 and WF-21BRC-5-22-26, shown on Page No's. 80 and 81, which are used for checking purposes were supplemented by forms shown on Page Nos. 82 and 84. It will be noted that the new form has a place for the eradication crew report as well as for the methods crew data.

WF-22-BRC-5-22-26

Ribes Check - - Type Record

TYPE				Difficulty of Working	Foreman Worked by Scout
State				Percent of Slope $\overline{4}$	Checked by
Unit				Density of Brush $\overline{4}$	Date
Type Area				Density of Windfall $\overline{4}$	Time
Ribes pulled on Type				Density of Rockcover $\overline{4}$	Percent of Check
Species	All Bushes	Over 6"	Over 12"	Age Class	Applied to
				Density of Timber	Feet Live Stem Pulled on Type
				Location of Plot	
				Strip	
Total				Time Spent Eradicating	

Plot or Strip No.	Area of Plot or Strip	Ribes Species	Height of Bushes over Feet of Live Stem															Total F.L.S.	Total Ribes Checked

WF-21BRC-5-22-26

Site of Missed Ribes

Site	Number of Missed Ribes			
				Total
Rock out-crops				
Raised ground adjacent mature trees				
Damp slope				
Alder bottoms				
Upturns				
Windfalls, under, or behind				
Dry draws				
On decayed stumps or logs				
Mulch of decayed branches				
In dense brush				
On creek banks				
Covered by pulled Ribes				
Total				

Relation of Missed Ribes to Adjacent Brush (or Reproduction)

Height of Ribes	Number of Missed Ribes			
				Total
Hidden by brush				
Partially hidden by brush				
Visible above brush				
No brush near Ribes				
Total				

Note: Are missed Ribes of general or localized distribution.

Table No. IV.

Advance Check Plot

Unit: Camp 2. Block: 1

State: Idaho

Location: Foot of rock slide on east slope of high hill S. of Camp 2.

General Data.-

Type	Acres	% Slope	% Brush	% Wind-fall	% Rock	Diff'y of work	Age Class	Ave. Crown Density	Acres Repre-sented	Flora
OR	0.5	4	24	12	20	15	O-M	3		Ninebark, Rubus, Alder, Etc.
Total	0.5	4	24	12	20		O-M	3		

Date: 6-27-26 Time: 9:00 - 11:40

Crew: Thompson, Swanson, Young.

Preliminary. count.

Type	Species	No. of Seedlings	Number of Ribes 6"-12"	Number of Ribes 12"	Number of Ribes Total	Total L. S.	Ave. L. S. per Bush	No. of Ribes per Acre	Ave. L. S. per Acre	Man Days to Work
	lac.	21	0	193	193	1908'	9.8'	286	3816.0	
CR	vis.	0	0	73	73	504	6.9	146	1008.0	1.0
Total	--	21	0	266	266	2412	9.0	532	4824.0	1.0

Date: 6-28-26 Time: 7-12 1-4 Foreman: A. Quine Crew Size: 7.

Table No. IV-A

Advance Check Plot

Eradication Report.-

Type	Acreage	Species	No. of Ribes Eradicated	No. of Ribes Eradicated per Acre	Total Man Days	Man Days per Acre	
		lac.	677	139			
OR	5.0	vis.	270	54	7.0	1.4	
Total	5.0		947	189	7.0	1.4	

Date 6-29-26 Time 12:45 - 1:55 Crew: Swanson, Young.

Final Check.-

Type	Species	No. of Missed Seed-lings	Number of Missed Ribes 6"-12"	12"	Total	Total Missed L. S.	Ave. LS per Missed Bush	No. of Ribes Missed per A.	Ave. Missed L. S. per A.	% Efficiency Based on No. of Ribes*	L. S.	Man Days to Work
	lac.	0	0	6	6	19	3.2	12	38.0	96.9	99.0	
OR	vis.	0	0	2	2	4	2.0	4	8.0	97.2	99.0	0.29
TOTAL		0	0	8	8	23	2.9	16	46.0	97.0	99.0	0.29

*In preliminary count.

W. C. Thompson

The following table shows the site of 1654 missed Ribes:

Table No. V.

Site of Missed Ribes

Site	Camp 2 R.lac	Camp 2 R.vis	Camp 2 G.iner	Camp 2 Total	Camp 3 R.lac	Camp 3 R.vis	Camp 3 G.iner	Camp 3 Total	Grand Total
Rock Outcrops	9	5	0	14	1	6	0	7	21
Raised ground, base of trees	65	3	0	68	8	8	5	21	89
Damp slope	13	0	0	13	1	43	0	44	57
Alder bottoms	15	0	1	16	14	0	1	15	31
Upturns	36	6	1	43	12	4	1	17	60
Windfalls	114	12	7	133	7	1	6	14	147
End of strip	8	0	0	8	2	0	0	2	10
Decayed stumps and logs	233	7	10	240	29	88	11	128	368
Mulch of Decayed Branches	171	17	12	200	36	173	20	229	429
Dense Brush	79	9	8	96	9	20	4	33	129
Creek banks	7	0	0	7	1	0	2	3	10
Covered by pulled Ribes	18	0	5	23	1	4	1	6	29
Opening in Brush	113	15	1	129	0	3	4	7	136
Pine Needle Carpet	1	0	0	1	0	0	0	0	1
Dry slope	0	0	0	0	4	40	1	45	45
On trail	58	14	2	74	4	2	2	8	92
Not visible from above	0	0	0	0	0	0	0	41*	0
Trampled under foot	0	0	0	0	0	0	0	10*	0
TOTAL	940	88	47	1075	129	392	58	579	1654

* Not included in totals

Relation to Surroundings.-

Relation	Camp 2 R.lac	Camp 2 R.vis	Camp 2 G.iner	Camp 2 Total	Camp 3 R.lac	Camp 3 R.vis	Camp 3 G.iner	Camp 3 Total	Grand Total
Hidden by brush	99	10	3	112	14	53	12	79	191
Partially hidden by brush	429	31	23	483	44	150	15	209	692
Visible above brush	96	17	9	122	31	81	10	122	244
No brush near Ribes	316	30	12	358	36	113	20	169	527
TOTAL	940	88	47	1075	125	397	57	579	1654

Experiments

The experimental methods work this season was severely handicapped by the loss of 35 days when fighting forest fires.

Root and Crown Study

At Camp 2, 100 Ribes lacustre, which were at the foot of a rock slide on a steep hillside, were marked with chalk on the rocks in such a way that the eradication crew would not notice the connection between the numerals and the Ribes. The eradication crew pulled all the bushes and left the following root parts in the ground but exposed to view:

Table VI.

No. of Exposed Crown Pieces left in Ground	Ave. Diam. of Exposed Crown Pieces	Total Exposed Length of Crown Pieces	No. of Exposed Root Pieces left in Ground	Ave. Diam. of Exposed Root Pieces	Total Exposed Length of Root Pieces
8	0.6"	27.0"	33	0.25"	449".0

About six weeks after eradication, the parts left in the ground were inspected and the sites of the 100 Ribes were marked by painted numbers on the rocks. No live Ribes growth was evident on the plot. The six week interval was dry and hot.

At Camp 3, in the alder stream type along Lamb Creek Ribes inerme were found and eradicated at the rate of 500 per acre. Fifty days after eradication (all but the last four days were dry) 0.4 acres were checked over and 19 Ribes inerme plants were found to have sprouted. These Ribes parts were removed from the ground and were measured with the following results:

Number of plants alive 19
Number of sprouts 54
Average length of root per plant . . . . 3.1 ft.
Average length of exposed root per plant . . . . 1.9 in.
Average height of sprouts . . . . 3.2 ft.
Number of plants with surface roots 15
Number of plants with tap roots 4

On the east side of Lamb Creek at Camp 3 in the same alder stream type as the other root and crown study plot, the following measurements were made of live Ribes growth after eradication. The Ribes parts were left in the ground for future inspection to determine sprout survival and growth.

Number of live plants 54
Number of sprouts 101
Average height of sprouts . . . . 1.5 in.
Old live stem left . . . . 17 in.

Number of exposed root or crown pieces. 57
Average diameter of root or crown pieces . . . . . 0.16 In.
Average exposed length of root or crown piece . . 2.9 in.

54 plants on 1.8 acres which were checked, is 30 Ribes per acre or 6% of the 500 original plants per acre. Perhaps tools could have been used to advantage in this type.

Up vs. Down Hill Eradication

In the open pole type of 28% slope and a medium amount of undergrowth at Camp 3, the Ribes efficiency of strip eradication up hill was compared with that down. A five man eradication crew was used. The strip boundaries were marked with small pieces of paper strewn along the ground. The Ribes were pulled by hand. The results are shown in the table:

Table No. VII.

	No. of Strips	Acres	Man Days per Acre	Ribes Eradication per Acre	Ribes Missed per Acre	L. S. Missed per Acre	Percent Efficiency Based on Ribes
Up hill	2	1.00	2.18	1123	32	34.0'	97.2
Down hill	3	1.35	1.39	1200	87	103.3	93.2

Close observations of the site of missed Ribes showed that 41 out of 118 missed bushes were not visible from the slope above the bush. Ten Ribes were trampled under foot by the workers in coming down the hill. Twenty missed bushes were on the paper trail in the down hill strip as compared with 2 missed Ribes on the uphill strip. Although this check is on a small acreage, it indicates that more care should be taken in down hill eradication. P. S. Simcoe says that if the eradication men look back up the hill for Ribes frequently when they are working the down hill strip, the eradication efficiency will be much more satisfactory.

Influence of Wet Brush on Ribes Eradication

Of four adjacent strips in stream type, two were eradicated in the morning of August 20, 1926, when the undergrowth was still wet from the previous day's rain. About noon when the brush had dried off the two remaining strips were eradicated by the same crew. The efficiency of eradication which was determined by methods crew checks over the entire four strips is represented in the following table. Although the experiment was performed on a small scale, it is interesting and should be tried on a more extensive plot next season.

Table No. VIII.

Efficiency of Eradication in Wet and in Dry Brush

Camp 2
See Plot 18

Date Eradicated	Strip No.	Acreage	Species	No. of Ribes Reported Pulled	No. of Ribes Pulled per Acre	No. of Missed Seedlings	Number of Missed Ribes 6"-12" High	Number of Missed Ribes Over 12" High	Number of Missed Ribes Total Excl. Sdlgs	Total L. S. Missed Ribes	Ave. L.S. per Missed Ribes	L.S. Missed per Acre	No. Ribes Missed per Acre	Efficiency on No. of Ribes	No. Missed Ribes on Trail	No. of Times off Trail	Man Days per Acre to Eradicate
Eradicated in Wet A.M.																	
8-20-26	D	0.6	R. lac.	230	431	2	3	14	17	37.0	2.2'	61'	28	93.9	0	0	4.16
			G. iner.	29		0	0	0									
	E	0.6	R. lac.	145	297	0	3	10	16	22.0	1.4	37	17	92.3	0	1	2.50
			G. iner.	34		0	1	2									
Total		1.2	R. lac.	375	365	2	6	24	33	59.0	1.8	49	27	93.1	0	1	3.33
			G. iner.	63		0	1	2									
Eradicated in Dry P.M.																	
8-20-26	I	0.5	R. lac.	108	216	0	1	4	5	8.5'	1.7	17	10	95.6	1	3	1.00
			G. iner.	0		0	0	0									
	J	0.4	R. lac.	257	653	1	1	4	5	12.0	2.4	30	13	98.0	0	0	0.80
			G. iner.	4		0	0	0									
Total		0.9	R. lac.	365	410	1	2	8	10	20.5	2.1	23	11	97.4	1	3	0.90
			G. iner.	4		0	0	0									

Efficiency Before and After Fires

Methods crew checks of the Ribes eradication work of Camp 2 crews prior to and after forest fire fighting shows that there was no pronounced change in the eradication efficiency. The following table requires no explanation.

Table No. IX.
Before and After Fire Efficiency

Camp 2
Strip Plot Checks (See 18)
Block 3.
Stream Type
Adjacent to Laying Trail Exp.

8 Man Crew
Paper Trail Laid by Crew.
Strips were 1 Chain Wide.

Date Eradicated	Strip No.	Acreage	Species	No. of Ribes Reported Pulled	No. of Ribes Pulled per Acre	No. of Missed Seedlings	Number of Missed Ribes 6"-12" High	over 12" High	Total Excl. Sdlgs	Total L.S. Missed Ribes	Ave. L.S. per Missed Ribes	L.S. Missed per Acre	No. Ribes Missed per Acre	Efficiency on No. of Ribes	No. Missed Ribes on Trail	No. of Times off Trail	Man Days per Acre to Eradicate
Before Forest Fire Season.-																	
7-9-26	A	1.5	R. lac.	3021		19	10	59									
			G. iner.	0	2014	0	0	5	74	253.5	3.4'	169'	49	97.6	3	3	5.33
7-10-26	B	1.5	R. lac.	2392		4	8	51									
			G. iner.	0	1595	0	0	1	60	176.5	2.9	118	40	97.6	5	1	3.33
Total	-	3.0	R. lac.	5413		23	18	110									
			G. iner.	0	1804	0	0	6	134	430.0	3.2	143	45	97.6	8	4	4.33
After Forest Fire Season.-																	
8-20-26. AM	D	0.6	R. lac.	230		2	3	14									
			G. iner.	29	431	0	0	0	17	37.0	2.2'	61'	28	93.9	0	0	4.16
8-20-26 AM	E	0.6	R. lac.	145		0	3	10									
			G. iner.	34	297	0	1	2	16	22.0	1.4	37	17	94.6	0	1	2.50
8-20-26 PM	I	0.5	R. lac.	108		0	1	4									
			G. iner.	0	216	0	0	0	5	8.5	1.7	17	10	95.6	1	3	1.00
8-20-26 PM	J	0.4	R. lac.	257		1	1	4									
			G. iner.	4	653	0	0	0	5	12.0	2.4	30	13	98.0	0	0	0.80
Total	-	2.1	R. lac.	740		3	8	32									
			G. iner.	67	384	0	1	2	43	79.5	1.9	38	21	94.8	1	4	2.39
Total Before and After.-																	
G. Total	-	5.1	R. lac.	6153		26	26	142									
			G. iner.	67	1219	0	1	8	177	509.5	2.9'	99'	34	97.1	9	8	3.53

Laying Trail Equipment

Introduction:- The usual method of marking the boundary of the completed strip in systematic Ribes eradication by strewing small pieces of paper along the ground at frequent intervals has not been altogether satisfactory. In hopes of overcoming its two disadvantages, namely delaying the forward motion of the crew by the lagging affect of the trail maker and the poor efficiency of the trail maker himself, ordinary white grocer's string was used as a trial. This twine sells at retail for .46¢ per lb. and one roll contains two pounds. The cost of the paper for a trail can be found in the 1925 methods crew report by J. L. Bedwell.

Procedure

The string which was carried on the back in the holder (see diagram) was laid in compass lines one chain apart before the eradication crew began work. Paper pieces (2" x 2.5") were strewn on the ground in compass lines one chain apart, also ahead of the crew. A combination of the latter trail and larger sized paper pieces (6" x 8") which were hung on tree branches and brush twigs at frequent intervals, was called the combination paper trail. A comparison of these three trails, laid ahead of the crew in strips one chain wide, and of the regulation paper trail as laid by one of the crew members at the time of eradication, was made on the basis of time to lay trail and Ribes eradication efficiency.

The experiment, when first tried on a small scale in the 30-35 year old burn south of camp 1, was of little value because the number of Ribes per acre was too small to give a satisfactory measure of efficiency. But the data on time to lay the trail is of value. At camp 3, string and paper plots were checked in advance of the crew, but to date they have not been eradicated. Until this is done and the final check is made, the data on these plots will be of no use except to compare the time of laying the different trails.

At Camp 2, the string (1 chain strips and also 0.5 chain strips) and the paper trails laid ahead of the crew on compass lines were compared with the regular 8-man crew (6-2 formation) which laid paper trail as it eradicated. The same 8-man crew was used throughout the experiment. The Ribes were hand pulled. Ralph Young laid trails ahead of the crew. The entire area was checked. 2.20 acres of advance check plots were used in the experiment.

Description of the Area

Field data collected on Block 3, Camp 2, were used in this experiment. Block 3 includes strips 1 to 14 inclusive and strips A to K inclusive (see map in field notes). Block 3 is 25.4 acres of stream type, flat, with dense brush, with mature timber in places, and with light to average shade. The flora consisted of white pine(50%), cedar, fir, hemlock, larch, thornapple, maple, willow, dogwood, service berry, devil's

[illegible] Trail [illegible]

Introduction:- The usual method of [illegible] of the [illegible] strip in systematic Ribes eradication [illegible] small [illegible] of paper along the ground at frequent intervals [illegible] factory. In hopes of overcoming [illegible] disadvantages, namely delaying the forward motion of the crew by the lagging [illegible] of the trail maker and the poor efficiency of the trail maker himself, [illegible] string was used as a trial. This twine sells [illegible] and one roll contains two pounds. The cost of [illegible] trail can be found in the 1925 methods crew report by [illegible].

Proced[illegible]

The string [illegible] the back in the holder (see diagram) [illegible] chain apart before the eradication crew began work. Paper [illegible] (" x ") [illegible] strewn on the compass lines [illegible] the crew. A combination [illegible] the latter [illegible] paper [illegible] (" x "), [illegible] on tree [illegible] intervals, [illegible] called [illegible] combination paper trail. [illegible] of the crew [illegible] laid [illegible] on the [illegible] of time [illegible] efficiency.

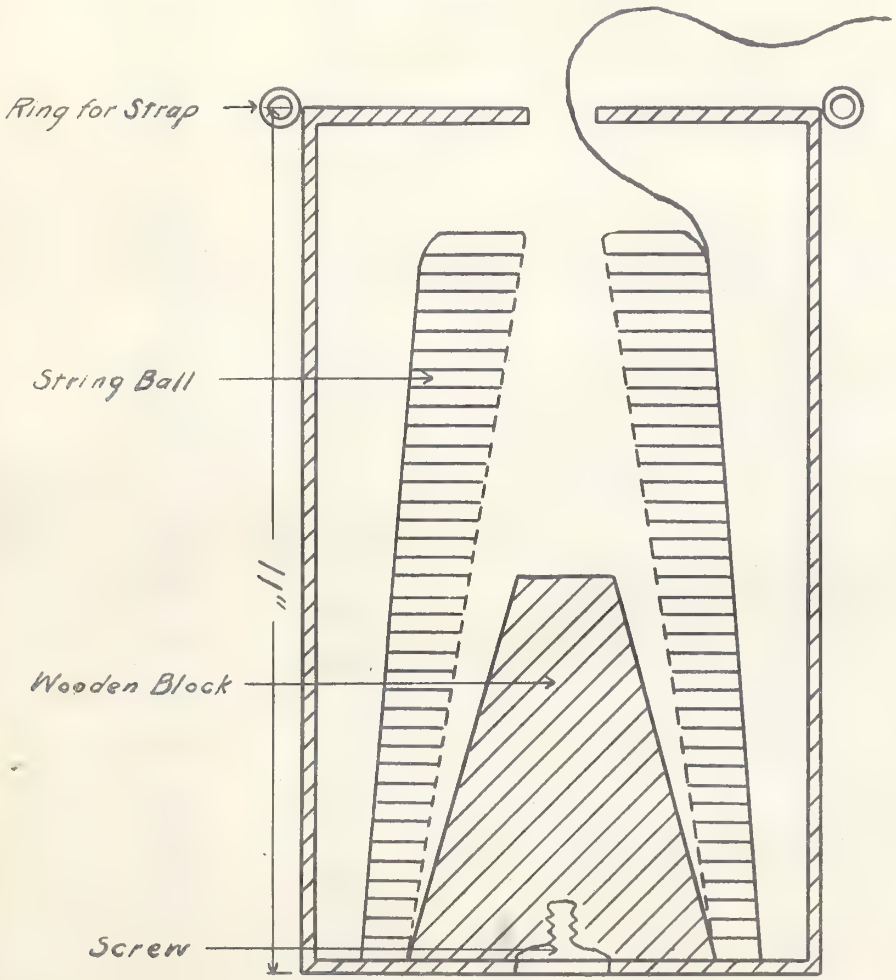
The experiment, when first tried [illegible] year old burn south of [illegible], was of little [illegible] Ribes per acre was too small to give a satisfactory [illegible]. But the data on time to lay the trail is [illegible] paper plots were [illegible] not been eradicated. [illegible] the data on these plots will be of no [illegible] laying the different trails.

At Camp 2, the string (1 chain strips and also 0.5 chain strips) and the paper trails laid ahead of the crew on [illegible] compared with the regular 5-man crew (5-2 [illegible]) [illegible] trail as it eradicated. The same [illegible]-man crew [illegible] periment. The Ribes were hand pulled. Ralph Young laid [illegible] the crew. The entire area was checked. 2.30 acres [illegible] were used in the experiment.

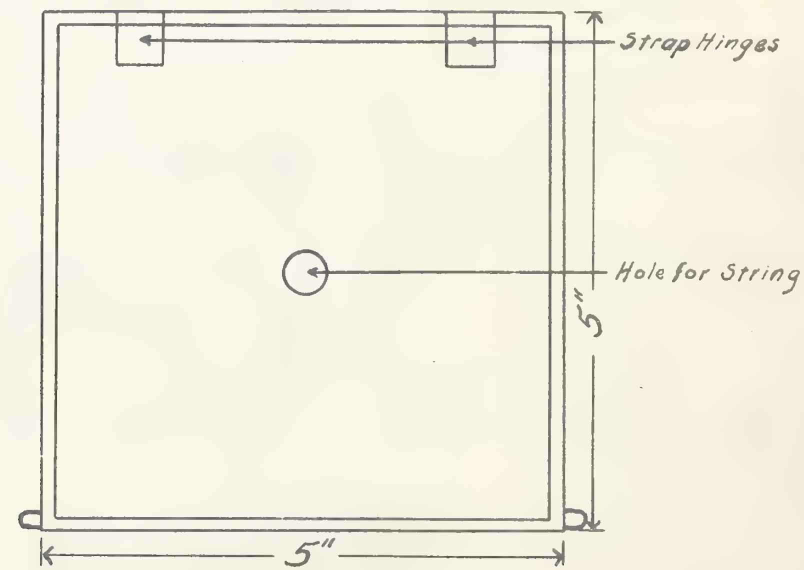
Description of the Area

Field data collected on Block 3, [illegible] periment. Block 3 includes strips 1 to 14 inclusive [illegible] inclusive (see map in field notes). Block [illegible] flat, with dense brush, with mature timber [illegible] average shade. The flora consisted [illegible] lock, larch, thornapple, maple, willow, dogwood, [illegible]

DIAGRAM OF STRING HOLDER



Longitudinal Cross Section



Top View

club, ferns, pyrola, skunk cabbage, nettles, thimbleberry, and Solomon's seal. The forest floor was needle covered to a depth of 2 inches, had an inch of duff, and there was sand and gravel underneath.

Cost of Laying Trail

The time to lay the different trails is shown separately and collectively for Camps 1, 2, and 3 by types in the accompanying table:

Table No. X.

Laying Trail Experiment

Trail	Type	Unit No.	Interval Between Lines	Minutes to Lay Trail per Mile	Length of Trail	Number of Parallel Trails	Minutes to Lay Trail
String	Stream	1	1 ch.	137.6	7.7	4	13.3
		2	1 ch.	229.6	88.0	5	253.0
		3	1 ch.	80.0	4.0	2	4.0
		Total	1 ch.	216.0	99.7		270.3
	O. R.	1	1 ch.	84.8	47.0	4	50.0
	D. R.	1	1 ch.	60.0	4.0	4	3.0
	O. P.	3	1 ch.	53.2	57.0	2	38.0
	D. P.	3	1 ch.	63.6	39.0	2	34.0
	Total		1 ch.	95.2	246.7		395.3
	Stream	2	0.5 ch.	122.4	108.0	5	165.0
2" x 3.5" Paper on Ground	Stream	1	1 ch.	152.0	14.1	4	28.0
		2	1 ch.	232.0	122.0	5	329.0
		3	1 ch.	106.4	6.0	2	8.0
		Total	1 ch.	204.8	142.1		365.0
	O. R.	1	1 ch.	296.0	10.4	4	39.0
	D. R.	1	1 ch.	200.0	20.0	4	51.0
	O. P.	3	1 ch.	95.2	68.0	2	81.0
	D. P.	3	1 ch.	156.8	26.0	2	51.0
	Total		1 ch.	176.0	266.5		587.0
Combination Paper Trail	Stream	1	1 ch.	280.0	10.0	4	35.0
	O. R.	1	1 ch.	232.2	36.0	4	105.0
	D. R.	1	1 ch.	336.0	11.3	4	48.0
	Total		1 ch.	262.4	57.3		188.0

The complete results to show the efficiency of eradication in the Camp 2, experiment are tabulated below:

Table XI.

Laying Trail Experiment - Camp 2.
- Efficiency of Eradication -
Figures Based on Eradication Crew Count.

Blocks
Stream Type
String 1 Chain
8-man Crew

Strip No.	Acreage	Species	No. of Ribes Reported Pulled	No. of Ribes per Acre	Number of Missed Ribes: Sdlgs Under 6" High	6"-12" High	Over 12" High	Total Sdlgs Excluded	Total L. S. Missed Ribes	Ave. L. S. per Missed Ribes	L. S. Missed per Acre	No. Ribes Missed per Acre	% Efficiency based on No. of Ribes	No. Missed Ribes on Trail	No. Times off Trail	Man Days to Eradicate per A.	Remarks
		R. lac.	2214		5	9	49										Compare
1	1.5	G. iner.	86	1533	0	0	2	62	253.0'	4.1'	163'	41	97.4	2	0	3.67	these fig-
		R. lac.	1362		4	14	35										ures with
2	1.8	G. iner.	345	948	0	0	1	50	180.5	3.6	100	28	97.1	2	0	2.92	Advance
		R. lac.	2286		4	4	69										Check in
3	1.7	G. iner.	203	1465	0	0	1	74	256.0	3.5	151	44	97.0	3	0	2.62	Strip 3
		R. lac.	1561		4	12	43										Which re-
4	1.8	G. iner.	332	1052	0	0	4	59	180.0	3.0	100	33	96.9	1	0	2.22	presents
		R. lac.			17	39	196										String
Total	6.8	G. iner.	8389	1234	0	0	8	245	879.5	3.9	129	36	97.2	8	0	2.82	Strips
Paper (1 ch. strip) (Laid ahead of eradication crew).																	
		R. lac.	1658		0	12	59										Compare
6	2.5	G. iner.	140	719	0	0	1	72	282.5	3.9	113	28	96.2	11	0	1.70	with ad-
		R. lac.	2382		7	18	37										vance Check
7	2.6	G. iner.	519	1116	0	1	5	61	191.5	3.1	74	24	97.9	7	1	1.96	in Strip 8
		R. lac.	2590		4	15	55										which re-
8	2.7	G. iner.	135	1009	0	0	8	78	297.5	3.8	110	29	97.2	9	0	2.45	presents
		R. lac.	1724		3	7	43										all 4 paper
9	2.5	G. iner.	248	789	0	1	9	60	190.5	3.1	76	24	97.0	7	0	2.00	Strips
		R. lac.			14	52	194										
Total	10.3	G. iner.	9396	912	0	2	23	271	962.0	3.6	93	26	97.1	34	1	2.03	
String (1/2 ch. Strip) (Laid ahead of eradication crew)																	
		R. lac.	797		1	4	31										Compare
11	1.1	G. iner.	0	725	0	0	2	37	88.5'	2.4'	80	34	96.6	9	0	1.57	with Strip
		R. lac.	511		7	7	26										13 Advance
12	1.1	G. iner.	54	514	0	1	9	43	158.5	3.7	144	39	92.9	11	0	1.59	Check which
		R. lac.	438		4	2	8										Represents
13	1.1	G. iner.	202	582	0	0	1	11	69.5	6.3	63	10	95.7	4	0	1. 48	all 4 of
		R. lac.	278		4	1	27										these
14	1.1	G. iner.	49	297	0	0	2	30	238.5	7.9	217	27	91.5	10	0	0.91	Strips
		R. lac.	2024		16	14	92										
Total	4.4	G. iner.	305	529	0	1	14	121	555.0	4.6	126	28	95.0	34	0	1.39	
Paper* (1 ch. strip) (Trail laid by crew at time of eradication) See Plots 18. 8-man Crew.																	
		R. lac.	5413		23	18	110										
A. B.	3.0	G. iner.	0	1804	0	0	6	134	430.0'	3.2	143	45	97.6	8	4	4.33	

*For Strips A. & B. separately, see "Before and After Fire" strip plot check 18.

The advance check plots of the laying trail experiment at Camp 2, are summed up in the following table:

Table No. XII.

Description	Difficulty of working	Preliminary Count Ribes per Acre	Ribes Eradicated per Acre	Ribes Missed per Acre	L. S. Missed per Acre	Efficiency Based on No. of Ribes	Efficiency Based on L.S.	Man Hours to Eradicate per Acre	Area Checked
String 1 Chain Wide	26	688.0	1465.0	72.5	255.0	90.4	95.4	20.9	0.40
Paper 1 Chain Wide	26	543.0	1009.0	78.5	79.0	86.0	94.8	7.8	0.70
String 0.5 Ch. Wide	26	198.2	581.8	10.0	63.2	95.7	96.4	11.9	1.10

Permanency of the Trails

The string and paper trails were laid at Camp 2 on July 8-10, 1926. Observations were made as to their condition on August 20, 1926, after the return from fighting fires. During the interval there was no rain until August 16, and then a heavy rain occurred. The ground was not dried out on August 20.

The condition of the string trail was good. It was still strong, up off the ground, and easily visible. It had been broken (probably by deer) 14 times in 196 chains of trail; but in no case would time have been lost by the crew in following the broken ends. The time to repair the string lines was 13 minutes.

The condition of the paper was not as bad as though there had been more rain in the interval between July 9 and August 20. The paper pieces were difficult to locate among the ferns and seemed to have disintegrated there

Difficulty of Working

It seems that the present difficulty factor tells part of but not all of the story. A scheme for the determination of eradication efficiency, has supplemented that factor. That question will not be considered here, but will be presented in a separate paper to be written later. Two tables which show the relationship between the present difficulty factor, the eradication efficiency and the time of eradication will be included here in order to place the information on record.

Table No. XIII.

Relation of Difficulty Factor to Eradication Efficiency

Camp No.	Plot No.	Type	Difficulty of Working	Acres Checked	Man Hours per Acre to Eradicate	Total Ribes per Acre	% Efficiency Based on No. of Ribes	% Efficiency Based on L. S.	L. S. Missed per Acre
2	14	S	26	6.80	22.6	1479	97		129.0'
2	15	S	21	0.20	45.0	220	88	97	255.0
2	22	S	19	0.50	45.0	1010	96		453.0
2	21	S	14	0.75	18.0	260	94		68.0
3	5	S	13	1.00	15.0	461	96		135.0
3	17	S	12	0.40	4.0	124	49		181.0
3	8	S	10	1.50	7.2	399	92		155.3
3	14	S	3	0.25		624	98	99	12.0
2	10	OP	34	0.37	64.8	768	93		150.0
2	8	OP	34	0.36	16.6	196	81		77.7
2	17	OP	31	9.00	1.1	34	94		12.0
2	12	OP	27	0.60	32.7	705	88	92	51.7
2	9	OP	26	3.00	0.3	7	55		18.0
3	11	OP	25	2.20	12.0	576	96		69.3
3	6	OP	21	1.00	15.0	639	89		199.0
3	3	OP	19	1.00	6.0	279	92		48.0
2	23	OP	18	0.50	5.0	456	92	90	5.0
3	12	OP	17	1.35	10.4	426	92		111.5
2	7	OP	16	2.30	4.8	29	80		15.0
3	4	OP	14	2.35	13.8	1214	96		73.8
3	5	OP	13	3.20	7.9	226	98		21.4
3	9	OP	13	1.50	10.4	75	74	78	60.3
3	1	OP	11	0.40	18.7	717	93	96	78.7
3	2	OP	11	1.00	20.0	1337	99		24.5
3	17	OP	5	0.40	1.4	56	100		0.0
2	5	OR	15	0.50	11.2	532	97	99	46.0
2	11	OR	13	0.50	8.5	52	92		13.0
3	17	DR	23	1.60	1.7	39	41		86.8
2	16	DR	21	0.90	31.1	754	96		150.0

Table No. XIV.

Relation of Ribes per Acre to Cost

Type	Ribes Per Acre	Man Hours per Acre	Difficulty Factor	Camp No.	Plot No.
S	1479	22.6	26	2	14
OP	1337	20.0	11	3	2
OP	1214	13.8	14	3	4
S	1010	45.0	19	2	22
OP	768	64.8	34	2	10
DR	754	31.1	21	2	16
OP	717	18.7	11	3	1
OP	705	32.7	27	2	12
OP	639	15.0	21	3	6
S	624		3	3	14
OP	576	12.0	25	3	11
OR	532	11.2	15	2	5
S	461	15.0	13	3	5
OP	456	5.0	18	2	23
OP	426	10.4	17	3	12
S	399	7.2	10	3	8
S	260	18.0	14	2	21
OP	226	7.9	13	3	5
S	220	45.0	21	2	15
OP	196	16.6	34	2	8
S	124	4.0	12	3	17
OP	75	10.4	13	3	9
OP	56	1.4	5	3	17
OR	52	8.5	13	2	11
DR	39	1.7	23	3	17
OP	34	1.1	31	2	17
OP	29	4.8	16	2	7
OP	7	0.3	26	2	9
O					

Note: Try plotting the Ribes per acre times man hours per acre.

Time and Cost Data

The monthly time records of Mr. Calhoun will show the division of time for the methods men (and eradicators as well) between the different projects. In case that the actual time for each experiment is required, it may be found in the Ribes field sheets. Time is usually expressed in man days and the cost per day is computed at the end of the season.

Future Methods Work

From various sources have been assembled ideas for methods of Ribes eradication. Perhaps it would be worth while to test out some of these plans next summer.

I. Should a scout crew use a one or two line formation and where should the foreman be located?

II. Find the relative efficiency and cost for trained eradicators and for those with little experience.

III. Is color blindness of eradicators a reason for missing Ribes?

IV. Find a scheme for eradicating "patches" of Ribes that are concentrated on one side of the strip.

V. What are the best sized crews for narrow and for wide stream bottoms?

VI. Eradication crew bush count reported to the foreman when every tenth bush has been pulled

VII. Should the eradication crew members use a stick for beating down the brush in a swamp when looking for Ribes?

VIII. Can an eradication crew do efficient work at Ribes eradication in wet brush?

REPORT ON THE PROGRESS OF THE
CHEMICAL ERADICATION OF RIBES

by

H. R. Offord, Agent

1. Introduction

This report deals with the progress of the chemical eradication of Ribes from January 1, 1926, to the present date. It intends to analyze all data taken from last year's experimental areas at Santa, Idaho, and Wallace, Idaho, and to summarize the more important observations made from those data. It also reports on the field experiments of this year, outlines the proposed scheme of research for the coming winter and presents tentative plans for work of the ensuing field season.

II. Research Work in Europe; and Eastern U. S.

The writer took leave of absence from the Office of Blister Rust Control last December and spent five months in Europe studying chemical methods of weed control and general plant physiology. Particular attention was paid to the physiology of absorption. Work was done at the University of London, the Library of the British Museum, London, England, and at the College de France, Ecole de Pharmacie and Bibliothēque Nationale, Paris, France. Many prominent chemists and experimental agriculturists were met and interviewed.

Work was commenced at Boston, Mass., by the writer on May 10. One month was spent in the Eastern and middle eastern states making arrangements pertinent to the successful organization of the summer's field work. Supplies of a commercial grade of chemicals needed for the field work were purchased from J. C. Wiarda & Co., of New York. The question of power equipment was fully discussed with the U. S. Forest Service and an inspection of their equipment was made. After a demonstration of several different types of spraying apparatus by their respective manufacturers, a four gallon Knap-sack sprayer made by D. B. Smith & Co., of Elmira, N. Y., was decided to be the most satisfactory. Five of these sprayers were purchased. The possibility of the use of collidal $CuCo_3$, $ZnCo_3$, and NaF, was discussed with Dr. Sullivan of the Colloid Equipment Company. Plans were made for the manufacture of these compounds by means of their special colloidal mill. While in Washington, D. C., and the Eastern States several field projects involving the practical application of chemical sprays were investigated. The Gypsy Moth Control Program and the Barberry Eradication work contributed valuable information on power sprayers, and stickers and spreaders of spray solutions. The Japanese Beetle research laboratory at Riverton, N. J., was visited, and after a detailed discussion of our problem with Mr. B. R. Leach, some experiments were made on cultivated red currants using CS_2

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as the killing agent. On the westward trip, stops were made at the Universities of Wisconsin and Minnesota, where our scientific problems were discussed with prominent specialists . Demonstrations of power equipment were made by Field Force and Pump Co., Elmira, N. Y., and by Northern Fire Pump Co., Minneapolis, Minn.

III. General Plan of Field Work - 1926

Outlined plans called for a (1) careful checking of all 1925 experimental plots, (2) testing of new killing agents on a small scale, (3) application of the best eradicator on a larger field test. Work was performed over three areas and the time allotted to each was as follows:

June 21-30, Wallace, Idaho. Checking of last year's plots on Lake Creek, respraying NaOH and testing $KClO_3$. Work done by Bell and Offord.

July 1-30, Checking plots on Renfrow Creek, Santa, Idaho, testing of new chemicals and respraying of Atlas N. P., NH_4Cl and NaOH. Work done by Bell, d'Urbal, Smith and Offord.

Aug.1-Sept. 15, Clarkia, Idaho. Application of $NaClO_3$ and NH_4Cl on a large scale. Study of crew methods and comparative costs. Work done by Bell, d'Urbal, Smith, Platt and Offord.

Since methods of data taking and general crew work at Wallace, Idaho, and Santa, in the main followed procedures used last year,a detailed description of those methods will not be given in this report. Work at Clarkia, Idaho, however, necessitated some modifications and a detailed description of crew work under those new conditions are given in this report.

A. Analysis of 1925 Experimental Plots:

(1) Wallace, Idaho. Three one acre plots were carefully checked and data taken according to the methods fully described in the 1925 report. The following table gives an analysis of the data taken over these plots.

Table No. I.
Wallace, Idaho.

Location of Experiment	Chemical Used	Concentration	Method of application	% Dead Stem 1926	% Bushes Killed 1926	Species and No. Treated
I.A.(1.0-3.50)	NaF	5%	Spray	11.5	3.4	R. petiolare. 7 clumps Ave. 7'x4'
I.A.(1.0-3.50)	NaF	5%	Spray	11.6	12.8	R. lacustre. 45
I.A.(3.50-3.60)	$HgCl_2$	2%	Spray	5.6	0.0	R. petiolare. 1 clump 33'x10
I.A.(3.50-3.60)	$HgCl_2$	2%	Spray	10.5	0.0	R. lacustre. 15
I.A.(3.60-3.75)	NaBr	10%	Spray	4.2	0.0	R. petiolare. 1 clump 33x5
I.B.(0.0-4.0)	A.N.P.	100%	Spray	91.5	72.1	R. petiolare. 41
I.B.(0.0-4.0)	A.N.P.	100%	Spray	95.5	72.4	R. lacustre. 62
I.B.(4.0-6.60)	A.N.P.	50%	Spray	90.5	65.5	R. petiolare. 47
I.B.(4.0-6.60)	A.N.P.	50%	Spray	95.5	53.0	R. lacustre. 45
I.A.(5.0-6.60)	A.N.P.	50%	Spray	99.8	93.7	R. petiolare. 2 clumps 8'x12" 5'x5'
I.A.(5.0-6.60)	A.N.P.	50%	Spray	79.6	68.8	R. lacustre. 32
II.B.(0.0-6.60)	A.N.P.	50%	Spray	99.6	92.1	R. petiolare. 57
II.B.(0.0-6.60)	A.N.P.	50%	Spray	94.2	51.5	R. lacustre. 177
III.A(0.0-4.50)	$Na_2B_4O_7$	10%	Spray	3.5	0.0	R. petiolare. 2 clumps 40'x20' 50'x35'
III.A(0.0-4.50)	$Na_2B_4O_7$	10%	Spray	11.8	0.0	R. lacustre. 40
III.B(0.0-6.0)	NaBr	10%	Spray	4.3	0.0	R. petiolare. 21
III.B(0.0-6.0)	NaBr	10%	Spray	12.8	0.0	R. lacustre 32

(2) Santa, Idaho. Five one acre plots were checked and data taken by a crew of four men. These data comprised feet of live stem and feet of dead stem of each Ribes, general notes on the effect of each chemical, and a count of the live and dead bushes. Time spent on this work was 348 man hours. The following tables present the analyzed data:

Table No. II.

Santa, Idaho.

Location of Experiment	Chemical Used	Concentration %	Method of Application	% Dead Stem 1926	% Bushes Killed 1926	Species and No. Treated
I. (0.0-2.0)B	A.N.P.	50	Spray	82.7	43.4	R. lacustre 355
I. (0.0-2.0)B	A.N.P.	50	Spray	68.7	19.1	G. inermis 144
I. (2.0-6.0)B	A.N.P.	33 1/3	Spray	69.1	14.1	R. lacustre 424
I. (2.0-6.0)B	A.N.P.	33 1/3	Spray	37.8	2.8	G. inermis 587
III. (2.0-3.0)B	A.N.P.	50	Spray	42.7	11.2	G. inermis 154
III. (0.0-1.0)B	A.N.P.	20	Spray	62.6	6.1	R. lacustre 25
III. (0.0-1.0)B	A.N.P.	20	Spray	29.5	5.2	G. inermis 145
II. (6.40-6.60)B	A.N.P.	100	Creek application	100.0	100.0	R. lacustre 8
II. (6.40-6.60)B	A.N.P.	100	Creek application	75.0	66.6	G. inermis 6
V. (0.0-1.0)B	A.N.P.	20	Creek application	60.7	50.0	R. lacustre 4
V. (0.0-1.0)B	A.N.P.	20	Creek application	59.1	13.2	G. inermis 112
I. (0.0-1.0)A	NaOH + NaF	2 and 4	Spray	29.0	0.0	R. lacustre 199
I. (0.0-1.0)A	NaOH + NaF	2 and 4	Spray	21.6	1.0	G. inermis 195
I. (1.0-2.0)A	NaOH	4	Spray	37.8	11.5	R. lacustre 56
I. (1.0-2.0)A	NaOH	4	Spray	30.1	3.5	G. inermis 262
I. (2.0-3.0)A	NaOH	4	Spray	76.0	0.0	R. lacustre 143
I. (2.0-3.0)A	NaOH	4	Spray	42.5	2.3	G. inermis 260
I. (3.0-4.0)A	NaOH	2	Spray	25.0	0.0	R. lacustre 112
I. (3.0-4.0)A	NaOH	2	Spray	17.5	1.2	G. inermis 107
II. (0.0-2.0)B	NaOH	4	Spray + Soil	31.2	0.0	R. lacustre 4
II. (0.0-2.0)B	NaOH	4	Spray + Soil	12.2	0.0	G. inermis 256
II. (5.0-6.0)B	NaOH	Solid	Creek application	15.0	0.0	G. inermis 57
II. (2.50-3.0)B	NaOH	5	Liquid + Soil	24.0	0.0	R. lacustre 10
II. (2.50-3.0)B	NaOH	5	Liquid + Soil	17.5	0.0	G. inermis 84
I. (4.0-5.0)A	NaF	4	Spray	32.1	0.0	R. lacustre 84
I. (4.0-5.0)A	NaF	4	Spray	18.6	1.2	G. inermis 96
II. (3.0-4.0)B	NaF	5	Creek application	12.0	0.0	R. lacustre 5
II. (3.0-4.0)B	NaF	5	Creek application	21.2	1.0	G. inermis 30
II. (5.0-6.0)B	NaF NaOH	5 and 4	Creek application	100.0	100.0	G. inermis 11
I. (6.0-6.60)A	NaBr	8	Spray	14.0	0.0	R. lacustre 9
I. (6.0-6.60)A	NaBr	8	Spray	20.2	1.3	G. inermis 153
I. (6.0-6.60)B	NaBr NaOH	8 and 4	Spray	31.6	0.0	R. lacustre 20
I. (6.0-6.60)B	NaBr NaOH	8 and 4	Spray	21.2	0.0	G. inermis 61
I. (5.0-6.0)A	$Na_2B_4O_7$	8	Spray	79.0	0.0	R. lacustre 43
I. (5.0-6.0)A	$Na_2B_4O_7$	8	Spray	32.2	1.0	G. inermis 183
II. (0.50-2.0)A	$CaCl_2$	10	Spray	47.2	0.0	R. lacustre 4
II. (0.50-2.0)A	$CaCl_2$	10	Spray	10.7	0.0	G. inermis 256
III. (5.0-6.60)A	$CaCl_2$	12	Spray	16.5	2.0	G. inermis 77
II. (2.0-2.40)A	$CaCl_2$	10	Creek application	48.0	0.0	R. lacustre 1
II. (2.0-2.40)A	$CaCl_2$	10	Creek application	10.4	0.0	G. inermis 95
III. (3.0-4.0)A	$CaCl_2$	1/2#-1# per bush solid	Creek application	75.0	12.5	G. inermis 60
IV. (4.00-6.00)A	KF	4	Spray	30.0	2.0	G. inermis 91
IV. (4.00-6.00)A	KF	4	Spray	35.0	0.0	R. lacustre 1
IV. (4.00-4.50)B	KF	4	Creek application	36.0	0.0	G. inermis 22
II. (2.40-3.00)A	NaCl	10	Spray	36.3	0.0	R. lacustre 2
II. (2.40-3.00)A	NaCl	10	Spray	13.1	0.0	G. inermis 95
II. (3.70-4.00)A	NaCl	20	Spray	26.6	0.0	R. lacustre 3
II. (3.70-4.00)A	NaCl	20	Spray	12.2	2.0	G. inermis 51
II. (5.00-5.70)A	NaCl	20	Creek application	19.1	2.0	G. inermis 66
II. (4.00-5.00)B	NaCl	1/2# Solid	Creek application	50.0	50.0	R. lacustre 4
II. (4.00-5.00)B	NaCl	1/2# Solid	Creek application	59.3	51.2	G. inermis 45
III. (1.00-1.50)A	NH_4Cl	20	Spray	97.8	0.0	R. lacustre 1
II. (1.00-1.50)A	NH_4Cl	20	Spray	39.1	0.0	G. inermis 70
II. (4.00-5.00)A	NH_4Cl	12½	Spray	30.9	0.0	R. lacustre 4
II. (4.00-5.00)A	NH_4Cl	12½	Spray	23.8	1.5	G. inermis 87
IV. (3.00-4.00)A	NH_4Cl	12½	Spray	25.0	0.0	G. inermis 75
II. (0.00-1.00)A	NH_4Cl	10	Spray	48.7	0.0	R. lacustre 6
II. (0.00-1.00)A	NH_4Cl	10	Spray	12.4	0.0	G. inermis 177
IV. (0.00-2.00)A	NH_4Cl	10	Spray	26.4	2.1	G. inermis 91
V. (3.00-4.00)A	NH_4Cl	5	Spray	25.0	0.0	R. lacustre 1
V. (3.00-4.00)A	NH_4Cl	5	Spray	10.0	0.0	G. inermis 60
IV. (6.00-6.60)B	NH_4Cl	1	Spray	11.5	0.0	G. inermis 68
IV. (0.00-0.40)B	NH_4Cl	Solid	Creek application	92.0	56.1	G. inermis 9
III. (3.0-4.0)A	NH_4Cl	Solid	Creek application	80.0	77.0	G. inermis 17
III. (3.0-4.0)A	NH_4Cl + NaOH	Solid	Creek application	55.0	62.1	G. inermis 8
III. (3.0-4.0)A	$NH_4Cl + (NH_4)_2Cr_2O_7$	Solid	Creek application	40.0	20.0	G. inermis 6
II. (6.00-6.60)A	NH_4Br	8	Spray	75.0	0.0	R. lacustre 1
II. (6.00-6.60)A	NH_4Br	8	Spray	19.0	3.3	G. inermis 30
IV. (2.00-3.00)B	NH_4Br	2½	Spray	20.0	0.0	G. inermis 113
IV. (1.00-2.00)B	NH_4Br	2½	Creek application	17.3	0.0	G. inermis 46
IV. (1.00-2.00)B	$(NH_4)_2Cr_2O_7$	2	Creek application	35.0	0.0	G. inermis 23
V. (4.00-5.00)A	NH_4NO_3	10	Spray	7.2	0.0	G. inermis 45
V. (5.00-6.60)A	NH_4NO_3	5	Spray	10.0	0.0	G. inermis 77
V. (5.00-6.60)A	NH_4NO_3	5	Spray	16.0	0.0	R. lacustre 3
V. (4.00-4.50)B	NH_4NO_3	20	Creek application	11.1	0.0	G. inermis 16
V. 3.00-4.00)B	NH_4NO_3	10	Creek application	5.6	0.0	G. inermis 44
V. (4.40-6.60)B	$BACl_2$	20	Spray	20.6	0.0	G. inermis 62
II. (6.00-6.60)B	$BACl_2$	8	Spray	7.9	0.0	G. inermis 32
III. 5.50-6.00)B	$BACl_2$	10	Creek application	3.1	0.0	G. inermis 45
II. (2.00-2.50)B	$CaOCl_2$	Solid	1/2 # - 1 # Creek application	35.0	12.1	G. inermis 62
III. (1.50-2.00)A	$CaOCl_2$	Solid	Dusted	50.0	0.0	R. lacustre 1
II. (1.50-2.00)A	$CaOCl_2$	Solid	Dusted	2.1	0.1	G. inermis 59
IV. (5.00-6.00)B	Kerosene	100%	Spray	49.6	14.4	G. inermis 42
IV. (5.00-6.00)B	Kerosene	100%	Spray	100.0	100.0	R. lacustre 3
IV. (4.00-5.00)B	Kerosene	100%	1/2 pint per bush Creek application	60.0	46.0	G. inermis 13
IV. (1.00-2.00)B	Kerosene + Acid Sludge	50% each	1 pint per bush Creek application	90.0	92.1	G. inermis 12
III (6.00-6.60)B	Acid Sludge + H_2O	50% each	1 pint per bush	85.0	65.0	G. inermis 7
IV. (1.00-2.00)B	Acid Sludge + H_2O	50% each	1 pint per bush	75.0	60.0	G. inermis 10

(3) General observations. Atlas N. P. - Concentration of 50% most effective as a spray. Ribes more resistent than nearby brush which for the most part has been killed. Vitality of Ribes very low. Sprouting has taken place from crowns. Effectiveness of this chemical decreases below a concentration of 50%. It is equally effective when used as a crown application concentration of 100%. R. petiolare is most susceptible and G. inermis least so. It is best applied early in the warm dry season. Chemical has excellent possibilities as an eradicator.

NaF. - No apparent effect when applied either as a spray or a creek application. Production of fruit this year seemed to be less than that of last year.

NaOH + NaF - Considerable lowering of vitality of plants. Very little growth has been made during 1926 season. Where plant has been killed back to crown the growth of sucker has been vigorous. Most effective when applied in liquid form around crown. R. lacustre and G. inermis equally susceptible. Ineffective as a spray but a good eradicator when used about the crown of the plant.

NaOH. - Highly caustic and rapid in its action. One spraying has no permanent deleterious effect. Two applications cause general lowering of vitality with death of small number of bushes and considerable stem killed. R. lacustre more susceptible than G. inermis . Applied as a crown application it is relatively non-effective. A concentration of 8-10% would be very toxic but extremely difficult to handle under field conditions.

NaBr. - Bushes appear vigorous. This chemical has killed a percentage of live stem but remaining portions of bush are flourishing. Action is somewhat more apparent on G. inermis than on R. lacustre.

NaBr + NaOH - When used in alkaline solution it is more effective. Does not seem to be a good killing agent.

$HgCl_2$ - Very caustic and rapid in its action. No permanent effect on bushes. Growth this spring was vigorous.

$Na_2B_4O_7$ - Ineffective both as a spray and as a crown application. Very little defoliation last year and the bushes quite vigorous this spring.

$CaCl_2$ - Most effective when applied to crown of plant in solid form 1/2# - 1# per bush. G. inermis more resistant than R. lacustre to the spray. Leaves of G. inermis were small and spotted the spring following treatment. Bushes vigorous for the most part. Possibilities as a crown application only.

KF - Equally effective when used both as a crown application or a spray. Bushes were obviously suppressed by treatment. R. lacustre and G. inermis equally resistant. This chemical might be quite effective

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in concentration of 10%.

$NaCl$ - Relatively ineffective when used as a spray. When used in solid form about the roots of the plants it gave a fair percentage of kill. The quantities of this chemical necessary to eradicate a large number of bushes would render its use impracticable. R. lacustre and G. inermis equally resistant.

NH_4Cl - Good possibilities as a killing agent. It has the same slow action on Ribes as the chlorates. Bushes that were sprayed last year are considerably suppressed although few have been killed outright. Crown application was quite effective. This chemical should be applied early in the growing season.

$(NH_4)_2Cr_2O_7$. - Used only as a crown application on G. inermis. It gave a percentage of complete kills and lowered the vitality of the bushes treated. Chemical is expensive.

NH_4Br - Not very toxic when applied either as a spray or crown application. Might be more effective if used in greater concentration than 8%. G. inermis much more resistant than R. lacustre.

NH_4NO_3 - Small amount of live stem killed. Chemical is relatively non-toxic. R. lacustre and G. inermis equally resistant.

$BaCl_2$ - No apparent loss of vigor on part of the bushes. Applied to G. inermis only.

$CaOCl_2$ - Applied in solid form as a crown application it gave a percentage of complete kills. Plants were somewhat suppressed when dusted over the bushes; it killed only a nominal percentage of live stem. Did not seriously impair the vigor of the plants.

Kerosene - Fairly effective when used as a crown application. It also gave a number of kills when sprayed on the bushes. Kerosene has possibilities as a killing agent.

Acid sludge - Used only as a crown application. Difficulty in handling this substance renders its use on a large scale impracticable. The material is quite cheap and gave a fair percentage of kill.

B. Experimental Work - 1926.

(1) Wallace, Idaho. Several stations over our Wallace plots were left unsprayed last year owing to the unexpected termination of the work. These areas were treated this year with $NaOH$ and $KClO_3$. Data relative to each separate experiment are presented in a form somewhat similar to that used in last year's report as follows:

in concentration of 10%.

NaCl - Relatively ineffective when used as a spray. When used in solid form about the roots of the plants it gave a fair percentage of kill. The quantities of this chemical necessary to eradicate a large number of bushes would render its use impracticable. *R. lacustre* and *G. inermis* equally resistant.

NH_4Cl - Good possibilities as a killing agent. It has the same slow action on Ribes as the chlorates. Bushes that were sprayed last year are considerably suppressed although few have been killed outright. Crown application was quite effective. This chemical should be applied early in the growing season.

$(NH_4)_2Cr_2O_7$ - Used only as a crown application on *G. inermis*. It gave a percentage of complete kills and lowered the vitality of the bushes treated. Chemical is expensive.

NH_4Br - Not very toxic when applied either as a spray or crown application. Might be more effective if used in greater concentration than 5%. *G. inermis* much more resistant than *R. lacustre*.

NH_4NO_3 - Small amount of live stem killed. Chemical is relatively non-toxic. *R. lacustre* and *G. inermis* equally resistant.

$BaCl_2$ - No apparent loss of vigor on part of the bushes. Applied to *G. inermis* only.

$CaOCl_2$ - Applied in solid form as a crown application it gave a percentage of complete kills. Plants were somewhat suppressed when dusted over the bushes; it killed only a nominal percentage of live stem. Did not seriously impair the vigor of the plants.

Kerosene - Fairly effective when used as a crown application. It also gave a number of kills when sprayed on the bushes. Kerosene has possibilities as a killing agent.

Acid sludge - Used only as a crown application. Difficulty in handling this substance renders its use on a large scale impracticable. The material is quite cheap and gave a fair percentage of kill.

B. Experimental Work - 1925.

(1) *Wallace, Idaho.* Several stations over our Wallace plots were left unsprayed last year owing to the unexpected termination of the work. These areas were treated this year with NaOH and $KClO_3$. Data relative to each separate experiment are presented in a form somewhat similar to that used in last year's report as follows:

1. Location data.
2. Number of each species of Ribes.
3. Date of application, amount of chemical used and method of application.
4. Chemical used and concentration.
5. Weather.
6. Remarks.

Plot I. - (3.50-3.60)A (Eastern side of cedar tree).

1. _R. petiolare_ 1 clump 15x5.
2. June 28, A.M. 6 gallons spray.
3. $KClO_3$-10% + NaOH - 2%.
4. Fine, warm; cloudy in P.M.
5. Spray spreads well but does not stick. Action of chemical fairly rapid. Defoliation 100%.

Plot I. - (3.50-3.60)A (Western side of cedar tree).

1. _R. petiolare_ 1 clump 15x5.
2. June 28, A.M. 3 gallons spray.
3. $KClO_3$ - 10%.
4. Fine, warm, cloudy in P. M.
5. Linseed oil 1% used as sticker and spreader. It increased the spray efficiency very well. Action of chemical slow. Defoliation 100%.

Plot I. - (4-5)A

1. _R. petiolare_ 42. _R. lacustre_ 12.
2. June 29, A.M. 6 gallons. P.M. 6 gallons spray.
3. $KClO_3$ - 10%.
4. Fine, hot, slightly cloudy in A.M.
5. Action of chemical slow. Defoliation 100%.

Plot II. - (0-1)A.

1. _R. petiolare_ 2 clumps, 4'x5', 2x4.
2. June 28, A.M. 7½ gallons crown application.
3. $KClO_3$ - 15%.
4. Fine, warm, cloudy.
5. No apparent effect when inspected on 8/12/26.

Plot II. - (0-1)A.

1. _R. petiolare_ 1 clump 4'x6.
2. June 29, P.M. 5 gallons creek application.
3. $KClO_3$ - 12% + NaOH - 2%.
4. Cloudy and sultry.
5. No immediate effect.

W128.
Typical growth of _G. inermis_ at Santa, Idaho.

W131.
Typical conditions at
Santa, Idaho.

W89.
Crew work, Santa, Idaho. Note G. inermis in foreground.

W188.
G. inermis and R. lacustre killed by Atlas N. P.

Plot II. - (1-2)A.

1. R. petiolare, 1 clump 4x4. R. lacustre 3.
2. June 30, A.M. 5 gallons Creek application.
3. $KClO_3$ - 12% + NaOH - 3%.
4. Cloudy and warm.
5. No immediate effect.

Plot III. (0-1)A.

1. R. petiolare. 1 clump 40x20. R. lacustre 10.
2. June 26, P.M. 9 gallons spray.
3. NaOH - 5%.
4. Fine, warm, cold nights with heavy dews in early A. M.
5. Rapid and complete defoliation.

Plot III. (1-2)A.

1. R. petiolare. 1 clump 20x10. R. lacustre 12.
2. June 25, P.M. 6½ gallons.
3. NaOH - 5%.
4. Fine and warm. Heavy dews in early A.M..
5. Rapid and complete defoliation.

(2) Santa, Idaho. One new area, Plot VI, was staked out the same size as the five plots laid out in 1925. Spraying data as well as Ribes data are given in tabular form. The scheme used last year in the marking and lettering of stakes was adhered to throughout. For purposes of clarity 1926 experimental stations have been lettered in green in place of the black used for 1925 work. Eight experimental areas were located along Renfrow Creek, in a stream type which contained R. petiolare and G. inermis mixed with Salix, Alnus and Craetegus. Several of last year's experiments were repeated in order to determine the efficacy of the chemical when applied twice over the same area. Chemicals tested in this manner were A.N.P., NH_4Cl, NaOH. A graphic plan of Plot VI, and the experimental detail of all work performed at Santa is given below. Results of these experiments shall be determined next spring after they have been carefully checked over and data worked up following the scheme used for 1925 plots.

Plot II. - (1-2)A.

1. R. petiolare, 1 clump 4x4. R. lacustre 3.
2. June 30, A.M. 5 gallons Creek application.
3. $KClO_3$ - 12% + NaOH - 3%.
4. Cloudy and warm.
5. No immediate effect.

Plot III. (0-1)A.

1. R. petiolare. 1 clump 40x20. R. lacustre 10.
2. June 25, P.M. 9 gallons spray.
3. NaOH - 5%.
4. Fine, warm, cold nights with heavy dews in early A. M.
5. Rapid and complete defoliation.

Plot III. (1-2)A.

1. R. petiolare. 1 clump 20x10. R. lacustre 12.
2. June 25, P.M. 6½ gallons.
3. NaOH - 5%.
4. Fine and warm. Heavy dews in early A.M.
5. Rapid and complete defoliation.

(2) Santa, Idaho. One new area, Plot VI, was staked out the same size as the five plots laid out in 1925. Spraying date as well as Ribes data are given in tabular form. The scheme used last year in the marking and lettering of stakes was adhered to throughout. For purposes of clarity 1926 experimental stations have been lettered in green in place of the black used for 1925 work. Eight experimental areas were located along Renfrow Creek, in a stream type which contained R. petiolare and R. inermis mixed with Salix, Alnus and Crataegus. Several of last year's experiments were repeated in order to determine the efficacy of the chemical when applied twice over the same area. Chemicals tested in this manner were A.W.P., NH_4Cl, NaOH. A graphic plan of Plot VI, and the experimental detail of all work performed at Santa is given below. Results of these experiments shall be determined next spring after they have been carefully checked over and data worked up following the scheme used for 1925 plots.

W9.
R. petiolare growing on Renfrow Creek, Santa, Idaho.

Plot VI. (5-6)B.

1. R. petiolare 8, R. lacustre 210, G. inermis 122.
2. July 23, A.M. 12 gals. spray.
3. R.B. II. 9%.
4. Ca. Cas. used as sticker. Action of chemical slow. Very little defoliation.

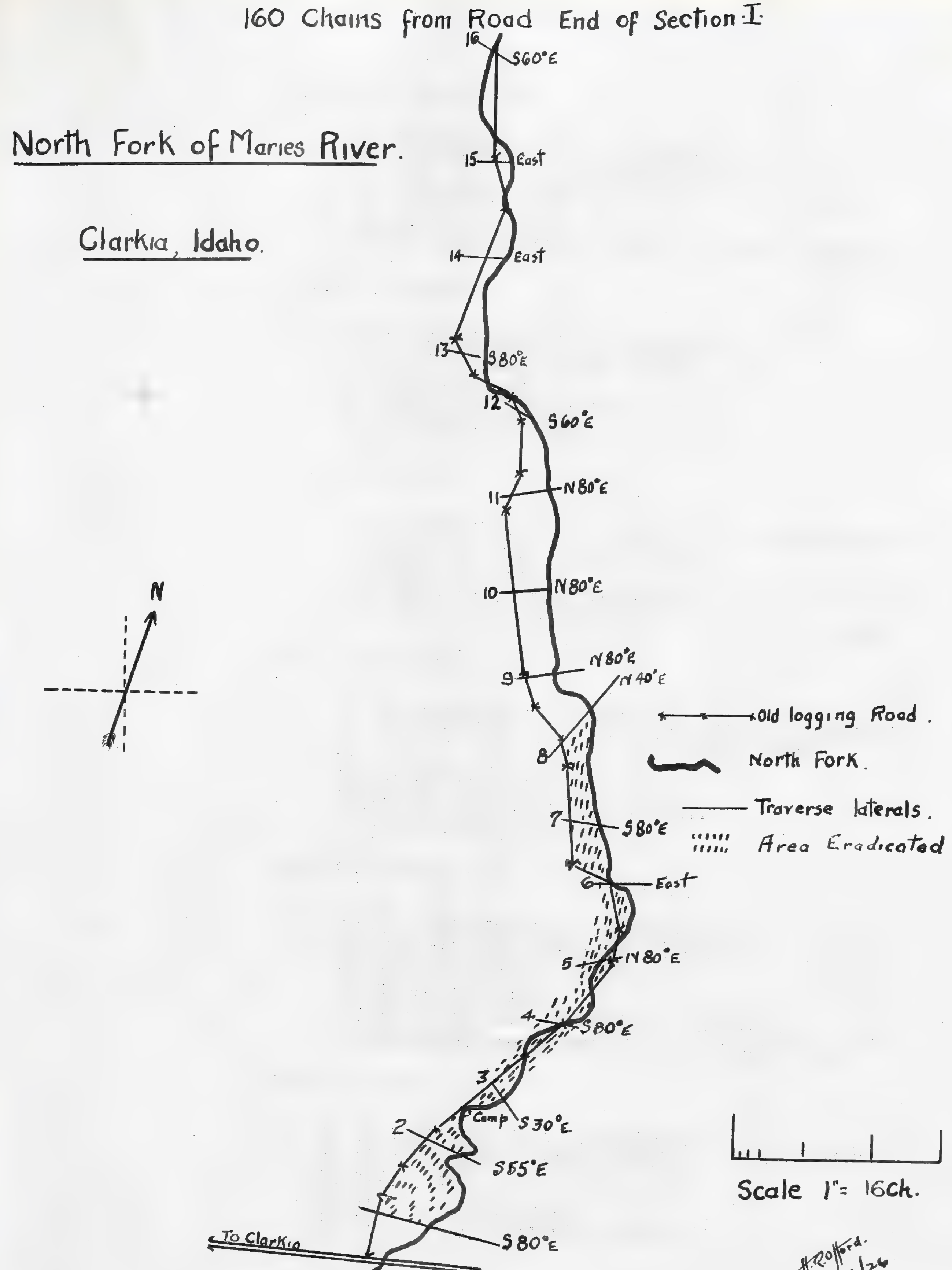
Plot VI. (6.0-6.6)B.

1. R. petiolare 1, R. lacustre 92, G. inermis 60.
2. July 22, P.M. 4 gals. spray.
3. Via Rasa - 6%.
4. Air is smoky, warm.
5. No apparent effect.

(3) Clarkia, Idaho - Description of the Area:

Work was commenced on the new area at Clarkia, Idaho, August 2nd. This area is flat-bottom stream type which has a brush covering of Salix, Alnus, Cornus and Crataegus. G. inermis grows in heavy concentration in the dense brush, while R. petiolare is found along the creek and in moist and more open spots. R. lacustre occurs at the base of the rocky outcrops on the lower hill slope of the drainage and with G. inermis in the bottom land. R. viscosissimum grows on both northern and southern slopes of the drainage. The area represents a good white pine site.

Mapping the Area and Data Taking: The North Fork of the St. Maries River was traversed and mapped. Lateral strips were run by compass line every eighth of a mile over two miles of the creek length. (See map) Ribes data were taken by two men along each lateral according to our old scheme, viz, feet of live stem, feet of dead stem and number of bushes. The width of the strip was 1/4 chain. On every other lateral a milacre plot was staked out in an area which was considered to be most representative of that block and Ribes data taken over the plot. The average figures obtained on the Ribes as a result of these two checks have been applied over the respective areas of each block. A block represents the area between two lateral strips and bounded by the logging road on one side and the main creek on the other (see Map.) These blocks are numbered I, II, III, and so on up to XVI. Table I gives the Ribes data for the sixteen blocks.


160 Chains from Road End of Section I
North Fork of Maries River.
Clarkia, Idaho.
N
16
S60°E
15
East
14
East
13
S80°E
12
S60°E
11
N80°E
10
N80°E
9
N80°E
N40°E
8
7
S80°E
6
East
5
N80°E
4
S80°E
3
Camp
S30°E
2
S55°E
S80°E
To Clarkia
Old logging Road.
North Fork.
Traverse laterals.
Area Eradicated.
Scale 1" = 16Ch.
H. Rolford.
10/26/26

Plot VI. (6.0-6.6)A.

1. R. lacustre 64, G. inermis 83.
2. July 22, A.M. $10\frac{1}{2}$ gals. spray.
3. $(NH_4)_2CO_3$ - 20%
4. Cloudy and cool.
5. Ca. Cas. as sticker. Fair. Partial defoliation.

Plot VI. (0-1)B.

1. R. lacustre, 10. G. inermis 7.
2. July 21, A.M. 1 gal. spray.
3. Via Rasa - 8%.
4. Fine, warm, very little wind.
5. No apparent effect.

Plot VI. (1-2)B.

1. R. petiolare 1, R. lacustre 8, G. inermis 49.
2. July 22, A.M. $1\frac{1}{2}$ gals. spray.
3. NH_4Cl - 25%.
4. Fine, warm, very little wind.
5. Action of chemical slow. Defoliation 100%.

Plot VI. (2-3)B.

1. R. petiolare 5, R. lacustre 66, G. inermis 84.
2. July 22, P.M. July 23 - $5\frac{1}{2}$ gals. spray.
3. R.B.I. - 8%.
4. Cloudy and cool.
5. Spreads and sticks very well. No apparent effect.

Plot VI. (3-4)B.

1. R. lacustre 43, G. inermis 94.
2. July 22, P.M. $5\frac{1}{2}$ gals. spray.
3. R.B. II. 8%.
4. Cloudy and cool.
5. Shows up white on foliage. Sticks to leaves extremely well. Action of chemical slow.

Plot VI. (4-5)B.

1. R. petiolare 1, R. lacustre 140, G. inermis 96.
2. July 23, A.M. 6 gals. spray.
3. R.B.I. 4%.
4. Air is smoky, warm.
5. Ca. Cas. as a sticker. Fair.

Santa, Idaho.

Plot VI. (0-1)A.

1. R. petiolare 1, R. lacustre 12, G. inermis 13.
2. July 21, 2 gals. spray.
3. R.B.I. 8%.
4.
5.

Plot VI. (1-2)A.

1. R. lacustre 9, G. inermis 70.
2. July 21, A.M. 3 gals. spray.
3. NH_4F - 4%.
4. Fine, warm, very little wind.
5. Flour 1% used as sticker. Not extremely effective. Defoliation 100%.

Plot VI. (2-3)A.

1. R. petiolare 9, R. lacustre 143, G. inermis 164.
2. July 20, P.M. 17 gals. spray.
3. NH_4Cl - 25%.
4. Fair, cloudy at intervals.
5. Flour 2% used as sticker. Fair. Defoliation 100%.

Plot VI. (3-4)A.

1. R. lacustre 119, G. inermis 225.
2. July 21, P.M. $8\frac{1}{2}$ gals. spray.
3. $(NH_4)_2CO_3$ - 20%.
4. Fine, warm, little wind.
5. Flour 1% as a sticker.

Plot VI. (4-5)A.

1. R. lacustre 130, G. inermis 96.
2. July 21, P.M. $8\frac{3}{4}$ gals spray.
3. $(NH_4)_2CO_3$ - 15%.
4. Fine, warm, little wind.
5. No apparent effect.

Plot VI. (5-6)A.

1. R. petiolare 3, R. lacustre 96, G. inermis 177.
2. July 22, A.M. 13 gals. spray.
3. NH_4F 10%.
4. Cloudy and cool.
5. Calcium caseinate, as a sticker. Fair. Defoliation 100%.

Sante, Idaho.

Plot VI. (0-1)A.

1. R. petiolare 1, R. lacustre 12, G. inermis 13.
2. July 21, 2 gals. spray.
3. R.B.I. 8%.
4.
5.

Plot VI. (1-2)A.

1. R. lacustre 9, G. inermis 70.
2. July 21, A.M. 5 gals. spray.
3. NH_4F - 4%.
4. Fine, warm, very little wind.
5. Flour 1% used as sticker. Not extremely effect-ive. Defoliation 100%.

Plot VI. (2-3)A.

1. R. petiolare 9, R. lacustre 143, G. inermis 164.
2. July 20, P.M. 17 gals. spray.
3. NH_4Cl - 25%.
4. Fair, cloudy at intervals.
5. Flour 2% used as sticker. Fair. Defoliation 100%.

Plot VI. (3-4)A.

1. R. lacustre 119, G. inermis 225.
2. July 21, P.M. 8½ gals. spray.
3. $(NH_4)_2CO_3$ - 20%.
4. Fine, warm, little wind.
5. Flour 1% as a sticker.

Plot VI. (4-5)A.

1. R. lacustre 130, G. inermis 95.
2. July 21, P.M. 8¾ gals spray.
3. $(NH_4)_2CO_3$ - 15%.
4. Fine, warm, little wind.
5. No apparent effect.

Plot VI. (5-6)A.

1. R. petiolare 3, R. lacustre 95, G. inermis 177.
2. July 22, A.M. 13 gals. spray.
3. NH_4F 10%.
4. Cloudy and cool.
5. Calcium caseinate, as a sticker. Fair. Defoliation 100%.

Table No. III.
Plot VI.

6.6	$(NH_4)_2CO_3$ 20% 10½ gals. sp. + Ca. Cas. 7/22/26	Via Rasa 6% 4 gals. sp. 7/22/26
6	NH_4F 10% 13 gals. sp. + Ca. Cas. 7/22/26	R.B.II. 4% 12 gals. sp. + Ca. Cas. 7/23/26
5	$(NH_4)_2CO_3$ 15% 8¾ gals. sp. 7/21/26	R.B. I. 4% 6 gals. sp. + Ca. Cas. 7/23/26
4	$(NH_4)_2CO_3$ 20% 8½ gals. sp. + Flour 7/21/26	R.B.II. 8% 5½ gals. sp. 7/22/26
3	NH_4Cl 25% 17 gals. sp. + flour 7/20/26	R. B. I. 8% 5½ gals. sp. 7/22-23/26
2	NH_4F 4% 3 gals. sp. + flour 7/21/26	NH_4Cl 25% 1½ gals. sp. 7/22/26
1	R.B. I. 8% 2 gals. sp. 7/21/26	Via Rasa 8% 1 gal. sp. 7/21/26
0	A	B

"Via Rasa" - Mixture of Na and Ca. Para Toluene Sulphonamide.

R.B.I. - Na Para Toluene Sulphonamide.

R.B.II. - Ca. Para Toluene Sulphonamide.

Ca. Cas. - Calcium Caseinate.

W192.
Brush conditions on the North Fork,
Clarkia, Idaho.

W180-W181.
Crew work with compressed air sprayers-
Santa, Idaho.

Table IV. groups together the experiments that have been made to note the comparative effects of one, two and three applications of a chemical.

Table No. IV.

Location	Chemical	Concentration	Quantity Used in Gals.	Method
Plot I (1-2)A	NaOH	4%	12	Sprayed(3)*
Plot I (2-3)A	NaOH	4%	$7\frac{1}{2}$	Sprayed (2)
Plot I (0-1)B	A.N.P.	50%	9	Sprayed (2)
Plot III (2-3)B	A.N.P.	50%	9	Sprayed (2)
Plot I (2-3)B	A.N.P.	33 1/3%	$7\frac{1}{2}$	Sprayed (2)
Plot III (0-1)B	A.N.P.	20%	4	Sprayed (2)
Plot II (4-5)A	NH_4Cl	20%	7	Sprayed (2)
Plot III(0-1.5)A	NH_4Cl	20%	17	Sprayed (2)
Plot V (2-3)B	NH_4F	4%	6	Sprayed (2)
Plot III (2-3)B	Stripped leaves off by hand for the 2nd time.**			

* Showed considerable dead stem (40%) and lowering of vitality of plant.
** No apparent effect.

In addition to the above areas resprayed the following experimental areas were laid out in the swampy brush type of Renfrow Creek.

Table No. V.

Number and Area	Chemical	Concentration	Quantity Used in Gals.	Method
X-I (69'x33')	Kerosene	100%	10 gals.	Sprayed
X-II (66'x16½")	R. B. I.	8%	10½ gals.	Sprayed
X-III (66'x16½')	R.B. II.	8%	6 gals.	Sprayed
X-IV (12'x20')	R.B. II.	8%	3 gals.	Sprayed on Stems alone
X-V (35'x10')	A.N.P.	50%	4 gals.	Sprayed
X-VI (66' x 16½')	Via Rasa	4%	6 gals.	Sprayed
X-VII(66' x 16½')	NH_4F	5%	6 gals.	Sprayed
X-VIII (66' x 33')	NH_4F	5%	6 gals.	Sprayed

N.B. - (1) Stakes marking the area and boundaries of 1926 plots are painted white and lettered in green. Black letters designate 1925 plots.

(2) Crown applications of the new chemicals were made on individual bushes marked with a small cedar stake.

Table IV. groups together the experiments that have been made to note the comparative effects of one, two and three applications of a chemical.

Table No. IV.

Location	Chemical	Concentration	Quantity Used in Gals.	Method
Plot I (1-2)A	NaOH	4%	1½	Sprayed (3)*
Plot I (2-3)A	NaOH	4%	7½	Sprayed (2)
Plot I (0-1)B	A.M.P.	4%	5	Sprayed (1)
Plot III (2-3)B	A.M.P.	50%	5	Sprayed (2)
Plot I (2-3)B	A.M.P.	33 1/3%	7½	Sprayed (3)
Plot III (0-1)B	A.M.P.	20%	4	Sprayed (1)
Plot II (4-5)A	NH_4Cl	20%	7	Sprayed (3)
Plot III (0-1.5)A	NH_4Cl	20%	17	Sprayed (2)
Plot V (2-3)B	NaOH	4%	5	Sprayed (2)
Plot III (2-3)B	Stripped leaves off by hand for the 2nd time.**			

* Showed considerable dead stem (40%) and lowering of vitality of plant.
** No apparent effect.

In addition to the above areas resprayed the following experimental areas were laid out in the swampy brush type of Beafrow Creek.

Table No. V.

Number and Area	Chemical	Concentration	Quantity Used in Gals.	Method
X-I (69'x35')	Kerosene	100%	10 gals.	Sprayed
X-II (66'x16½')	[illegible]	[illegible]	10 gals.	Sprayed
X-III (66'x16½')	R.B. II.	[illegible]	6 gals.	Sprayed
X-IV (12'x20')	R.B. II.	[illegible]	3 gals.	Sprayed on Stems alone
X-V (35'x10')	A.M.P.	50%	4 gals.	Sprayed
X-VI (65' x 16½')	Via Rasa	4%	5 gals.	Sprayed
X-VII (65' x 16½')	NH_4F	5%	6 gals.	Sprayed
X-VIII (65' x 33')	NH_4F	5%	6 gals.	Sprayed

N.B. - (1) Stakes marking the area and boundaries of 1926 plots are painted white and lettered in green. Black letters designate 1925 plots.

(2) Crown applications of the new chemicals were made on individual bushes marked with a small cedar stake.

Table No. VI.

Block Number	No. of Bushes per Acre			Ft. of Live Stem per Acre			Ft. of Dead Stem per Acre		
	R. petiolare	R. lacustre	G. inermis	R. petiolare	R. lacustre	G. inermis	R. petiolare	R. lacustre	G. inermis
I	94	73	313	3356	2460	3900	105	115	440
II	258	231	240	82240	13250	43400	8060	3980	4475
III	220	360	200	135520	18800	27540	59320	-	6140
IV	584	86	140	200215	8320	18900	19400	-	1270
V	1008	43	81	27800	292	1105	2560	-	-
VI	300	50	312	78250	1430	54900	8600	-	8750
VII	346	226	612	68400	18340	75650	10500	2270	18100
VIII	343	163	343	91950	3140	28500	15700	310	4240
IX	72	309	10	35200	8770	105	17100	2220	-
X	273	464	-	49450	10020	-	630	126	-
XI	480	100	-	265310	3700	-	50580	-	-
XII	507	292	78	113550	30070	17550	20200	5275	2440
XIII	120	200	-	62600	20880	-	4000	2000	-
XIV	416	416	-	27950	29760	-	6740	960	-
XV	160	40	-	208120	8000	-	44000	2000	-
XVI	40	160	-	4000	9400	-	2000	400	-
Average per A. Over Area	326	201	138	78,276	12,352	17,590	16,843	1,227	2,897

W196.
General view of area worked, North Fork, Clarkia, Idaho.

W195.
R. petiolare and G. inermis pulled from 1/10 acre, Clarkia, Idaho.

Method of Working Area: Each block was marked out into 24 foot strips by means of string lines running parallel to the original laterals, except where the creek came within 24 feet of the road; in this event the strip was laid parallel to the stream. A crew of four men sprayed this 24 foot strip, working up one strip and back on the next. The spraying crew was managed by the assistant foreman, while the foreman marked out strips, made up solutions and kept up the supplies of chemicals. The crew worked so that the line of sprayed bushes was always behind them. This was necessitated by the concentration of Ribes, in order to avoid shaking off the chemical after it had been sprayed. Two types of sprayers were used (1) a three gallon compressed air sprayer, (2) a four gallon knap-sack sprayer. The former seemed more satisfactory over the more open ground, while the latter was preferable in the denser brush.

Summary of Work Done at Clarkia, Idaho: Six chemicals were used in the experimental work over a total of 14.62 acres. The average cost was $27.41 per acre. Full details of the work are given in Table VIII, under cost analysis. Particular attention was paid to methods of crew work, and two types of apparatus were used under the varying conditions encountered over the entire area. This phase of the work is discussed at some length under spray efficiency and crew management in this report. A number of different stickers and spreaders were tested in combination with the sprays used. Inflammability tests on sodium chlorate and on mixtures of sodium chlorate and calcium chloride were tried out. After a period of from six to seven days of fine hot weather following the application of $NaClO_3$ the only fire hazard constituted is that of any very dry material, that is to say, after that time the chemical itself does not entail a risk. The addition of calcium chloride to the chlorate spray cuts down the explosive violence of the chlorate but does not entirely destroy its inflammable nature.

R. petiolare fruit sprayed with the various chemicals as well as fruit from unsprayed bushes were collected. It is planned to carry out germination tests at the University of California this winter in order to determine the effect of chemicals upon the fertility of R. petiolare seed.

Reference to the map of the Clarkia area shows the location of the work and the progress made.

V. Cost Analysis

The following section of the report presents an analysis of the costs of the field project for the season 1926. A summary of the acreage and cost of eradication over the Clarkia area as well as comparative figures on chemical vs. hand eradication are also given. In closing this discussion it might be of interest to compare the average cost of $59.10 per acre for the work done in 1925 with that of $27.41 per acre for eradication in 1926. It must also be kept in mind that the eradication of one acre of Ribes of this concentration from the stream bottom means the protection of some 30 to 40 acres of white pine on the neighboring hillside where the concentration of Ribes is very small. On a water-shed basis this brings the cost per acre of pine protected well within practical limits.

Total cost of Chemical Eradication Field Project

June 1 to September 15.

Payroll	$1157.26
Subsistence	512.05
Chemicals	279.13
Transportation of Men	173.79
Equipment	45.65
Transportation of Equipment	8.39
Transportation of Chemicals	132.67
Miscellaneous	12.50
Total Cost of Project . .	$2321.44
Less Total Cost of Chemicals .	411.80
Total Labor Cost	$1909.64
Time in man hours spent on project	2574
Labor Cost per man spraying hour	$ 0.742

On August 22, a representative strip (4.5 x .36) sq. chains of the Clarkia area was first sprayed and then hand eradicated to determine the relative costs. The tables given below show the results obtained and are given on an acreage basis.

Table No. VII.

Chemical Eradication

Walking Time on Job	Preparation of Chemical	Walking and Finding	Spraying Time	Gals. Used	Chemical Cost per Acre	Labor Cost per Acre	Total Cost per Acre
65 m.m.	278 m. m.	277.5m.m	925 m.m	77.2	15.15	11.08	26.23

Table No. VIII.

Hand Eradication

Walking Time to Job	Walking and Finding	Pulling Time	Labor Cost per acre.
65 m. m.	185 m. m.	3490 m. m.	$41.80

Table No. IX.

Eradication Costs - Clarkia, Idaho

Chemical	Total Ribes Live stem per acre	Block No.	Acre-age	Man Spraying Hours		Gallons of Chemical		Chemical Cost		Labor Cost		Total Cost	
				per Acre	per 1000' Live stem	per Acre	per 1000' Live Stem	per Acre	per 1000' Live Stem	per Acre	per 1000' Live stem	per Acre	per 1000' L. Stem
NH_4F - 4%	9,716	I	3.80	7.02	0.72	16.3	1.63	1.15	0.12	5.19	0.53	6.34	0.65
NH_4Cl - 20%	9,716	I	1.21	17.34	1.73	48.5	4.85	8.40	0.86	12.83	1.28	21.23	2.14
$KClO_3$ - 4%	138,890	II	1.40	47.57	0.34	160.0	1.15	5.20	0.03	35.29	0.25	40.49	0.28
$NaClO_3$ - 25%	181,860	III	1.70	22.26	0.12	110.0	0.65	21.40	0.11	16.47	0.09	37.87	0.20
$(NH_4)_2CO_3$ - 20%	227,435	IV	.78	23.84	0.11	104.0	0.45	19.10	0.08	17.64	0.08	36.74	0.16
$NaClO_3$ - 25% + $CaCl_2$ - 6¼%)	29,197	V	1.16	12.13	0.42	72.3	2.48	17.54	0.60	8.98	0.31	26.52	0.91
$NaClO_3$ - 25% + $CaCl_2$ - 6¼%)	134,580	VI	2.59	12.81	0.10	67.8	0.51	15.42	0.114	9.48	0.07	24.90	0.18
$NaClO_3$ - 25% + $CaCl_2$ - 6¼%)	162,390	VII	1.98	13.52	0.09	80.7	0.50	18.38	0.113	9.90	0.07	28.28	0.18

Explanatory Notes on Table No. IX. (Cont'd).

Block No.	Percentage L. S. of Ribes Species			Remarks
	R. petiolare	R. lacustre	G. inermis	
I	33.4	33.3	33.3	Total L.S. should have been 40,000 ft. The area was cut up by grass land making estimates applied on the area too low.
II	70	10	20	Conditions on II. and III. were uniform.
III	70	10	20	Reference to Table No. IX. shows that costs are in good agreement.
IV	89.4	3.5	7.1	This area was more open R. petiolare in more open location without brush covering.
V	69.2	7.7	23.1	Area was cut up by windings of main stream and several back-washes of stream. L. S. estimate should be 100,000.
VI	50	10	40	Uniform conditions on VI. and VII. Ribes species in same proportion also give good agreement on cost figures.
VII	40	10	50	

VI. Relative to:

A. Spray Efficiency.

At this point it might be of interest to review the factors which seem to constitute the total effectiveness of a spray. For the sake of brevity they are presented here in tabular form.

1. Uncontrollable factors.

   (a) Weather.
   - (1) Heavy dews cause a dilution and wastage of chemical.
   - (2) Rain shortly after application with a resulting loss of chemical.
   - (3) High wind at time of application, causing too vigorous shaking of bushes.
   - (4) High relative humidity tending to slow down the process of absorption, if this condition has prevailed for a few days previous to spraying.

   (b) Screening effect of nearby foliage.
   (c) Physical structure of the leaf.
   - (1) Glabrous or non glabrous.
   - (2) Smooth or sticky surface.
   - (3) Manner in which the leaf hangs from the bush.
   - (4) Drooping.
   - (5) Straight or at right angles to stem.
   - (6) Erect and somewhat cup shaped.

   (d) Loss of chemical through stock grazing.

2. Controllable factors.

   (a) Careful and efficient work on the part of the crew.
   (b) Good mechanical equipment. The apparatus should provide-
   - (1) Fine, misty spray. (Too fine a spray is not desirable since the loss of spray due to evaporation is quite appreciable on a warm windy day.

   (c) Mechanical spreading and sticking of the spray.
   - (1) This is obtained with a good air pressure type of sprayer having a vermorel nozzle. Sufficient velocity of the liquid is necessary so that the spray will "flatten out" when it hits the leaf.

VI. Relative to;

A. Spray Efficiency:

At this point it might be of interest to review the factors which seem to constitute the total effectiveness of a spray. For the sake of brevity they are presented here in tabular form.

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(b) Screening effect of nearby foliage.

(c) Physical structure of the leaf.
- (1) Glabrous or non glabrous.
- (2) Smooth or sticky surface.
- (3) Manner in which the leaf hangs from the bush.
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- (5) Straight or at right angles to stem.
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(d) Loss of chemical through stock grazing.

2. Controllable factors.

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(c) Mechanical spreading and sticking of the spray.
- (1) This is obtained with a good air pressure type of sprayer having a vermorel nozzle. Sufficient velocity of the liquid is necessary so that the spray will "flatten out" when it hits the leaf.

(d) Use of chemical spreaders.

(1) To spread well a spray should have a low surface tension between itself and the solid sprayed. If the spray does not spread well a substance should be added that will reduce the surface tension of the solution.

The following substances have been tested during the last field season as stickers and spreaders: (1) Linseed oil, (2) Flour, (3) Soap, (4) Calcium Caseinate, (5) glue, (6) Sunoco-self-emulsifying oil, (7) fish oil soap. Field observations on the efficacy of these spreaders would indicate the following:

Linseed oil - Good if used with neutral electrolytes of low concentration.

Flour - Fair for acid, neutral or alkaline solutions.

Soap - Fair if used with amphoteric electrolytes.

Calcium Caseinate - Good when used as spreader for NH_4Cl spray.

Glue - Good with any concentration of electrolyte whether acid, alkaline or neutral. Effective with $NaClO_3$ spray.

Sunoco oil - Fair, when used with electrolytes of low concentration.

Fish oil soap - Good with any concentration of electrolytes whether acid, neutral or alkaline.

The ideal time for wet spraying seems to be early in the growing season. At the time of application dull weather is probably better than hot dry weather if the humidity is low. If the sun is too hot immediately after application a certain amount of the chemical will dry on the leaf and drop off before it has a chance to penetrate, particularly so if a high wind prevails. A period of hot, dry weather a few days after application and a slight fall of dew in the early morning provides ideal conditions.

B. Crew Management.

We may consider this phase of the work in the final analysis to be the practical application of the chemical under field conditions. When we seek to eradicate Ribes by means of chemicals we must face not only the ordinary problems of crew management but the additional task of providing these men with a continuous supply of chemical. As a result, our methods will have to be more elastic than those of hand eradication if we are to handle the exigencies of our work. The work performed to date has been carried on by a crew of five men. A three gallon compressed air sprayer (Albert Lea Sprayer Co., Albert Lea, Minn.) and a four gallon knap-sack sprayer (D.B. Smith Co., Utica, N. Y.) have been used by the crew in its work. Although we do not intend to use this small hand type of equipment on a large scale, yet there will doubtless be areas or portions of areas that can be more economically eradicated by this method. For that reason it is advisable to briefly review the experience that we have had with this type of equipment.

(d) Use of chemical spreaders.

(1) To spread well a spray should have a low surface tension between itself and the solid sprayed. If the spray does not spread well a substance should be added that will reduce the surface tension of the solution.

The following substances have been tested during the last field season as stickers and spreaders: (1) Linseed oil, (2) Flour, (3) Soap, (4) Calcium Caseinate, (5) glue, (6) Sunoco-self-emulsifying oil, (7) fish oil soap. Field observations on the efficacy of these spreaders would indicate the following:

Linseed oil - Good if used with neutral electrolytes of low concentration.

Flour - Fair for acid, neutral or alkaline solutions.

Soap - Fair if used with amphoteric electrolytes.

Calcium Caseinate - Good when used as spreader for NH_4Cl spray.

Glue - Good with any concentration of electrolyte whether acid, alkaline or neutral. Effective with $NaClO_3$ spray.

Sunoco oil - Fair, when used with electrolytes of low concentration.

Fish oil soap - Good with any concentration of electrolytes whether acid, neutral or alkaline.

The ideal time for wet spraying seems to be early in the growing season. At the time of application dull weather is probably better than hot dry weather if the humidity is low. If the sun is too hot immediately after application a certain amount of the chemical will dry on the leaf and drop off before it has a chance to penetrate, particularly so if a high wind prevails. A period of hot, dry weather a few days after application and a slight fall of dew in the early morning provides ideal conditions.

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1. Chemical supplies: Chemicals were purchased in barrel lots, freighted to the nearest railway station and then hauled out to the job by auto truck. Spray solutions were prepared at base camp and charged at once into the individual sprayers. A twelve-gallon copper boiler was found to be the most convenient type of container for mixing solutions. Each crewman had a particular job assigned to him, i.e., measuring out water, stirring the solution, filling the sprayers. The foreman saw that the proper amounts of ingredients were used and kept his notes apace of all operations. When the crew had worked the area adjacent to the camp it was found more convenient to carry a supply of chemicals out of camp and make up the solutions on the ground. The proper weight of dry chemical was placed in a small flour sack and securely tied. The foreman then carried several of these charges of chemical in a pack sack sufficient for the morning's work or the job on hand.

2. Working the ground. The area worked was at Clarkia, Idaho, previously described. String was used to mark the boundaries of working strips and proved quite satisfactory. The crewmen worked four abreast at a distance of six feet from one another. It was found undesirable to have a foreman check behind the crew in heavily concentrated Ribes areas since he knocked off a considerable portion of the spray from the bushes. The foreman was responsible for the supply of chemical and laid out the work in advance of the crew. One of the crewmen designated as assistant foreman looked after line formation and managed the crew in the absence of the foreman. The men worked so that the line of sprayed bushes was always behind them. When large individual clumps of bushes were sprayed the men always worked from the centre toward the outer fringe. The men were instructed to look after all clumps of bushes on their own line to avoid "doubling up" on the application of spray. This was done unless the concentration was too high in which case the next man would swing from his line and assist.

Test strips were run using the two different types of apparatus over the same ground and the actual spraying time taken. The number of gallons of chemical used was also measured. The comparative figurea are given in tabular form.

Table No. X.

Relative Efficiency of Two Types of Sprayers

Strip No.	Gals. Used Knap-Sack	Gals. Used Compressed Air	Spraying Time Knap-sack	Spraying Time Compressed Air	Remarks
1	$10\frac{1}{4}$	11	85 m. m.	124 m. m.	thick brush over Area
2	$6\frac{1}{4}$	$7\frac{1}{4}$	59 m.m.	72 m. m.	Thick brush over Area
3	10	7	80 m.m.	84 m. m.	More open Area
4	9	$7\frac{1}{2}$	80 m.m.	80 m. m.	More open Area
5	$17\frac{3}{4}$	14	149 m.m.	132 m. m.	More open Area *

* Extension used on compressed air sprayer.

The above figures as well as the general opinions of the crew-men would show that the knap-sack style of sprayer was easier to handle in the thick brush. Where the going was more open the compressed air sprayer, particularly when fitted with a $1\frac{1}{2}$ ft. extension rod seemed to have advantages. This latter type also involves less labor on the part of the men since it is necessary to continually pump the former in order to deliver the spray.

Although the use of power equipment will completely modify the handling of the men, nevertheless, we shall always find locations where it will be more practical to use this scheme. A combination of power and hand equipment offers the most likely solution of the difficulties met under varied field conditions.

VII. General Summary of Results

Experiments on the chemical eradication of wild currants and gooseberries (Ribes) were commenced June 1924. Possible killing agents were selected from the following (a) soluble inorganic salts, (b) oxidizing acids (c) bases (d) organic acids (e) oils. The results of three years of field experiments 1924, 1925, 1926, would indicate that a suitable killing agent can be found in (a) above. One of the most valuable results of these field experiments has been to point out the possible channels by which an intelligent understanding of our problem might be reached if the necessary research work were undertaken. The following observations and results have been made from field data:

1. From present data spraying seems to be the best means of attack and the only one capable of general application.

II. Ribes can be killed by a single spraying with a soluble inorganic salt.

   a. Best results have been obtained with $NaClO_3$ - 25%.
   b. NH_4Cl - 20%, NH_4F -4%, $KClO_3$ - 4% also act in a similar manner to $NaClO_3$.

III. Absorption seems to take place, since the roots and crowns have been killed after spraying of the aerial portions.

IV. The different species of Ribes show a range of susceptibility

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Relative Efficiency of Two Types of Sprayers

Strip No.	Gals. Used Knap-Sack	Gals. Used Compressed Air	Spraying Time Knap-sack	Spraying Time Compressed Air	Remarks
1	10½	11	85 m. m.	124 m. m.	Thick brush over Area
2	5½	7½	55 m.m.	72 m. m.	Thick brush over Area
3	10	7	61 m.m.	84 m. m.	More open Area
4	6	7½	60 m.m.	80 m. m.	More open Area
5	17½	14	149	152 m. m.	More open Area *

* Extension used on compressed air sprayer.

The above figures as well as the general opinions of the crew-men would show that the knap-sack style of sprayer was easier to handle in the thick brush. Where the going was more open the compressed air sprayer, particularly when fitted with a 1½ ft. extension rod seemed to have advantages. This latter type also involves less labor on the part of the men since it is necessary to continually pump the former in order to deliver the spray.

Although the use of power equipment will completely modify the handling of the men, nevertheless, we shall always find locations where it will be more practical to use this scheme. A combination of power and hand equipment offers the most likely solution of the difficulties met under varied field conditions.

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III. Absorption seems to take place, since the roots and crowns have been killed after spraying of the aerial portions.

IV. The different species of Ribes show a range of susceptibility

to different chemicals and even to different concentrations of the same chemical.

V. Three defoliations by means of NaOH - 4% does not kill an appreciable percentage of bushes.

VI. Best results are obtained by spraying during warm dry weather.

VII. Fish oil soap 0.1% by weight of $NaClO_3$ - 25% spray is the best sticker and spreader. Calcium Caseinate 1.0% by weight is the best spreader for NH_4Cl - 20%.

VIII. $NaClO_3$ - 25% spray after drying on the foliage is highly inflammable. This property is lessened though not entirely destroyed by addition of $CaCl_2$ - 25% by weight.

IX. Chemicals of a highly caustic nature (NaOH) or highly toxic and corrosive nature (H_gCl_2) are not desirable, since they cause rapid defoliation and have no permanent effect on Ribes. Bushes are completely releafed two weeks after treatment with a chemical of this nature. Complete kills have been obtained only with chemicals of "subtle toxic" or slow poisonous nature e. g. ($NaClO_3$ - NH_4Cl).

X. Salix and Alnus have been completely defoliated and smaller bushes killed when lower stems only were sprayed with $NaClO_3$.

These observations indicate that the basic problem is that of absorption of the chemical in such a concentration that immediate death does not result; rather a disturbance of the physiological equilibrium of the plant and a resultant sickening over a longer period that finally proves fatal.

Basic Problems to be Answered by This Investigation

1. What measures the toxicity of a chemical or how can we establish a convenient "measuring stick" to express the toxic effect of a chemical on Ribes?

II. Do we actually obtain absorption of the chemical through the leaves and stems?

III. If so under what conditions and what factors influence absorption and consequent death? Concentration of solution? Kind of ion? Temperature? Sunlight? Physiological state of the plant itself?

VIII. Proposed Future Work

A. Laboratory Work

At the close of the field season, the writer was transferred to Berkeley, California, where cooperative arrangements were made with the Divisions of Forestry and of Plant Nutrition for laboratory and greenhouse space wherein to carry on investigational work. The following memorandum addressed to Dr. D. R. Hoagland, Head of the Division of Plant Nutrition, explains the purpose and nature of the proposed work. Part of this memo-

randum is omitted, as it dealt only with a summary of the previous work.

B. Greenhouse Work - Preparation of Material.

1. a. Ribes farm on campus.
   b. Potted plants under greenhouse conditions.

   These plants to be grown from roots and crowns of Ribes brought in from field.

2. Experiments on the fertility of Ribes seed that have been sprayed with $NaClO_3$ and NH_4Cl.

C. Organization of Laboratory Work.

1. Study the absorption of a series of soluble inorganic salts, e.g. NaF, NaCl, NaBr, NaI.
   Kf, KCl, KBr, KI.
   Does the increasing elector-positive nature of the cation increase or decrease the ease of absorption of the anion and vice-versa?
   Using dilute solutions of the above chemicals measure the electrical conductivity of electrolyte to determine the amount absorbed.

2. Trace the course of some chemical through the plant system - either by microscopic examination of stained plant sections or by spectroscopic detection of a salt (lithium chloride).

3. Test the absorption of $NaClO_3$ varying the factors.
   (1) Concentration.
   (2) Temperature.
   (3) Light of different wave lengths.
   (4) Application of chemicals to leaves and stems, stems, upper surface of leaf, lower surface of leaf, entire leaf.

   Cover parts of plant with oiled paper and spray or apply chemical by means of a small brush.

4. Compare the absorption of KBr (relatively non-toxic) with that of $KBrO_3$ (toxic). Qualitative examination of different portions of the plant to determine the amount of bromine present. Such experiments to be carried on under varying conditions of temperature, light and moisture.

The following points should also be included in our studies if we are to make a complete investigation of the problem. Some of these problems are specific problems that have arisen in the course of field experiments:

1. Investigations of the - increase of solubility of $KClO_3$.
2. Investigations to - cut down the inflammability of $NaClO_3$.
3. Investigations of - spreaders and stickers for use with chlorate sprays.
4. Investigations of - new killing agents.
   a. Colloidal ($Zn\ CO_3$, $CuCO_3$).
   b. Oil emulsions with toxic constituent.
5. Investigations of promotors or activators of physiological action of the toxic chemical used.

D. Field Work - 1927.

It is now felt that the work has progressed sufficiently to justify a thorough test of power equipment. A study of this apparatus should be made this winter by our methods study men in cooperation with the writer and it is planned to obtain a practical demonstration of several types of power units. A suitable area from next years eradication project in California has been selected and eradication of that area according to our best methods should be made early next season.

Experimental areas at Wallace, Santa and Clarkia, Idaho, should be rechecked and all available data recorded. It is advisable to continue our work in Idaho on a larger scale. This scheme of work should include the use of power equipment over accessible areas, as represented by last year's location at Clarkia, Idaho. Past experience has shown us that the different Ribes species show varying degrees of susceptibility to chemical treatment. For this reason it seems advisable to concentrate our attention on one or two of the more important species. R. peticlare and G. inermis (with the inevitably associated R. lacustre) represent a type that is very difficult and costly to hand eradicate. Experiments carried out during the summer of 1926 have shown that this type can be more cheaply "eradicated" by the chemical method. Until we are satisfied both with the chemical and methods of application we should focus our attention on areas similar to that of Clarkia, Idaho.

W191.
Preparing the chemicals.

W194.
Loading up with a charge of spray solution.

W193.
Loading up with a charge of spray solution.

W198.
Off for the job.

W185.
Chemical eradication crew at work spraying Ribes underneath brush.

W202.
Working in the brush.

RIBES ECOLOGY

by

W. A. Rockie
Assistant Pathologist

For the purposes of this report, the various studies undertaken on this project have been discussed under the following heads:

Germination Studies:

- Ribes Germination Plots (Upper Priest River)
- Germination on Old Camp Sites (Upper Priest River)
- Viability of Ribes Seeds
- Burn Studies

Growth Studies:

- Leaf Area - Live Stem Ratio Study
- *Ribes lacustre* Studies (Upper Priest River)
- *Ribes viscosissimum* Studies (Elk River - Sanders)
- *Grossularia inermis* Studies
- Age Studies of Ribes

Ribes Germination Plots, Upper Priest River

I. Purpose of the Study

The purpose of the study of these plots is to aid in drawing conclusions regarding the respective parts played by the several causative factors in the germination role of Ribes.

II. Methods of Study Used

Each plot is one meter square. A check plot of equal size with undisturbed natural conditons adjoins each plot. Seeds of *R. viscosissimum* or *R. lacustre* or both were planted in both the plot and the check plot. No actual count of the seeds was made, but fifteen fruits of given species were planted for each square meter plot. Varying degrees and conditions of duff mantle and of shade conditions prevailed on the several plots. Plantings were made in the summer of 1925.

III. Results of Study

Plot A:

Practically level alluvial bottom site.
50% crown canopy 175 feet high.
No brush shade.
Ground heavily burned.
Planted to R. lacustre only.
Located in a large depressional area which had served in 1924 as the evening camp-fire site. Now 60% is covered with a very large vigorous Marchantia.
Four seedlings of R. lacustre found, so scattered as to indicate that they came from separate fruits. These seedlings are 0.1 of a foot maximum height.

Plot B:

Practically level alluvial land (immediately adjoining Plot A, but about 2 feet higher.)
50% crown canopy 175 feet high.
No brush shade.
Ground burned moderately.
Planted to R. lacustre only.
Twenty-two R. lacustre seedlings.

- 1 group of six plants together
- 2 groups of five plants each
- 6 separated plants

Two seedlings of entire number are over 0.1 foot high.
Check plot for Plot A and Plot B. (Adjoins plot B. on the east)
Conditions identical with Plot B.
Conditions practically identical with Plot A.
No Ribes planted.
No Ribes found.

Plot C:

Level alluvial bottom land.
50% crown canopy 175 feet high.
No brush shade.
Ground slightly burned with scattering bits of charcoal.
Planted to R. viscosissimum only.
Ground almost entirely covered by Marchantia in 1926.
Three R. viscosissimum seedlings .15 of a foot high.

Plot D:

Practically level alluvial bottom land.
50% crown canopy 175 feet high.
No brush shade.
Ground slightly burned and loose remnants of duff scraped away for this germination test.
Planted to R. viscosissimum only.
Almost entirely covered with Marchantia in 1926.
Eight R. viscosissimum seedlings in the plot.
(Two other R. viscosissimum seedlings just outside the line of the plot but within the are from which the surface litter was scraped.)

Plot E:

Level alluvial bottom land.
50% crown canopy 175 feet high.
No brush shade.
Ground slightly burned, having some scattered surface litter and charcoal.
Planted to R. viscosissimum only.
Ground 99% covered by very vigorous Marchantia.
No Ribes found.

Plot F:

Level alluvial bottom land.
50% crown canopy 175 feet high.
No brush shade.
Ground slightly burned, partially covered with scattering bits of charcoal.
Planted to R. lacustre only.
Ground 2/3 covered by very vigorous Marchantia.
No Ribes found.

Plot G:

Level alluvial terrace 15 feet above Upper Priest River.
98% crown canopy 175 feet high.
95% Taxus shade 3 feet to 5 feet high.
Ground artificially bared of duff mantle.
Planted to R. lacustre only.
Four R. lacustre seedlings less than .01 of a foot high.

Plot H:

Level alluvial terrace 15 feet above Upper Priest River.
99% crown canopy 175 feet high.
95% Taxus shade 3 feet to 5 feet high.
Ground artificially bared of duff mantle.
Planted to R. viscosissimum only.
No Ribes found.
Many seedlings of other genera germinating abundantly.
One seedling too small to identify which greatly resembles Ribes.

Plot I: (Same as Plot G except for duff)

Level alluvial terrace 15 feet above Upper Priest Riber.
98% crown canopy 175 feet high.
95% Taxus shade 3 feet to 5 feet high.
Duff mantle left intact.
Planted to R. lacustre only.
No Ribes found.

Plot J: (Same as Plot H except for duff)

Level alluvial terrace 15 feet above Upper Priest River.
98% crown canopy 175 feet high.
95% Taxus shade 3 feet to 5 feet high.
Duff mantle left intact.
Planted to R. viscosissimum only.
No Ribes found.

Plot K:

20% southwesterly slope.
No crown canopy.
Practically no brush shade.
Natural bare mineral soil.
Planted to R. lacustre only.
No Ribes found.

Plot L: (Same as Plot K)

20% southwesterly slope.
No crown canopy.
Practically no brush shade.
Natural bare mineral soil.
Planted to R. viscosissimum only.
No Ribes found.

Plot M:

20% southwesterly slope.
30% crown canopy of 25-30 year white pine with limbs to ground.
No brush shade other than pine.
Mineral soil covered with undecayed needles.
Planted to R. lacustre only.
No Ribes found.

Plot N: (Same as Plot M)

20% southwesterly slope.
30% crown canopy of 25-30 year white pine with limbs to ground.
No brush shade other than pine.
Mineral soil covered with undecayed needles.
Planted to R. viscosissimum only.
No Ribes found.

Plot O:

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Natural duff ground cover.
Planted to R. lacustre only.
No Ribes found.

Plot P: (Same as Plot O except for duff)

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Natural duff artificially removed to bare mineral soil.
Planted to R. lacustre only.
No Ribes found.

Plot Q: (Same as Plot O except for Ribes species)

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Ground cover consists of natural duff and a very rotton log.
Planted to R. viscosissimum only.
No Ribes found.

Plot R: (Same as Plot F except for Ribes species)

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Natural duff artificially removed to bare mineral soil.
Planted to R. viscosissimum only.
No Ribes found. Young seedlings too small to identify which resemble Ribes.

Plot S: Four meters square.

Level alluvial terrace along Upper Priest River.
100% crown canopy 175 feet high.
No brush shade.
Natural duff conditions.
Planted to R. lacustre and R. viscosissimum only.
No Ribes found.

Plot T:

Level alluvial bottom along Lime Creek.
40% crown canopy 175 feet high.
60% Acer and Salix shade.
Duff from beneath white pine mature forest spread over alluvial soil.
Planted to R. lacustre only.
No Ribes found.

Plot U:

Level alluvial bottom along Lime Creek.
40% crown canopy 175 feet high.
60% Acer and Salix shade.
Duff from beneath white pine mature forest spread over alluvial soil.
Planted to R. viscosissimum only.
No Ribes found.

Plot V:

Level alluvial bottom along Lime Creek.
40% crown canopy 175 feet high.
No brush shade.
Duff from beneath white pine forest spread over alluvial soil.
Planted to both R. lacustre and R. viscosissimum seeds.
No Ribes found.

Of the 22 plots listed, 6 were on burned ground and 16 were on unburned soil. Four of the six plots on burned ground showed very positive germination totaling 26 R. lacustre and 11 R. viscosissimum while one of the 16 plots on unburned ground showed germination, four R. lacustre in all.

No germination was found on duff-covered soils, 10 plots of this character having been established.

Of 12 plots from which all duff was either lacking or was artificially removed, five plots showed a germination totaling 30 R. lacustre and 11 R. viscosissimum.

Of the 22 plots, 11 were established under fairly open light conditions, and 11 under very dense shade. Of the five plots showing germination, four were under open light conditions, and one was beneath dense shade. Twenty-six R. lacustre and 11 R. viscosissimum germinated under the lighter conditions, while four R. lacustre germinated under heavy shade.

IV. Summary

Duff appears to prohibit Ribes germination.
Light appears to stimulate Ribes germination.

Germination on Old Camp Sites

I. Purpose of the Study

The purpose of this study is to aid in drawing conclusions regarding the respective parts played by the several causative factors in the germination role of Ribes.

II. Methods of Study Used

All camp sites of previous years were carefully examined regarding the germination of Ribes on the areas where soil and other conditions had been altered by the artificial conditions of the camp development.

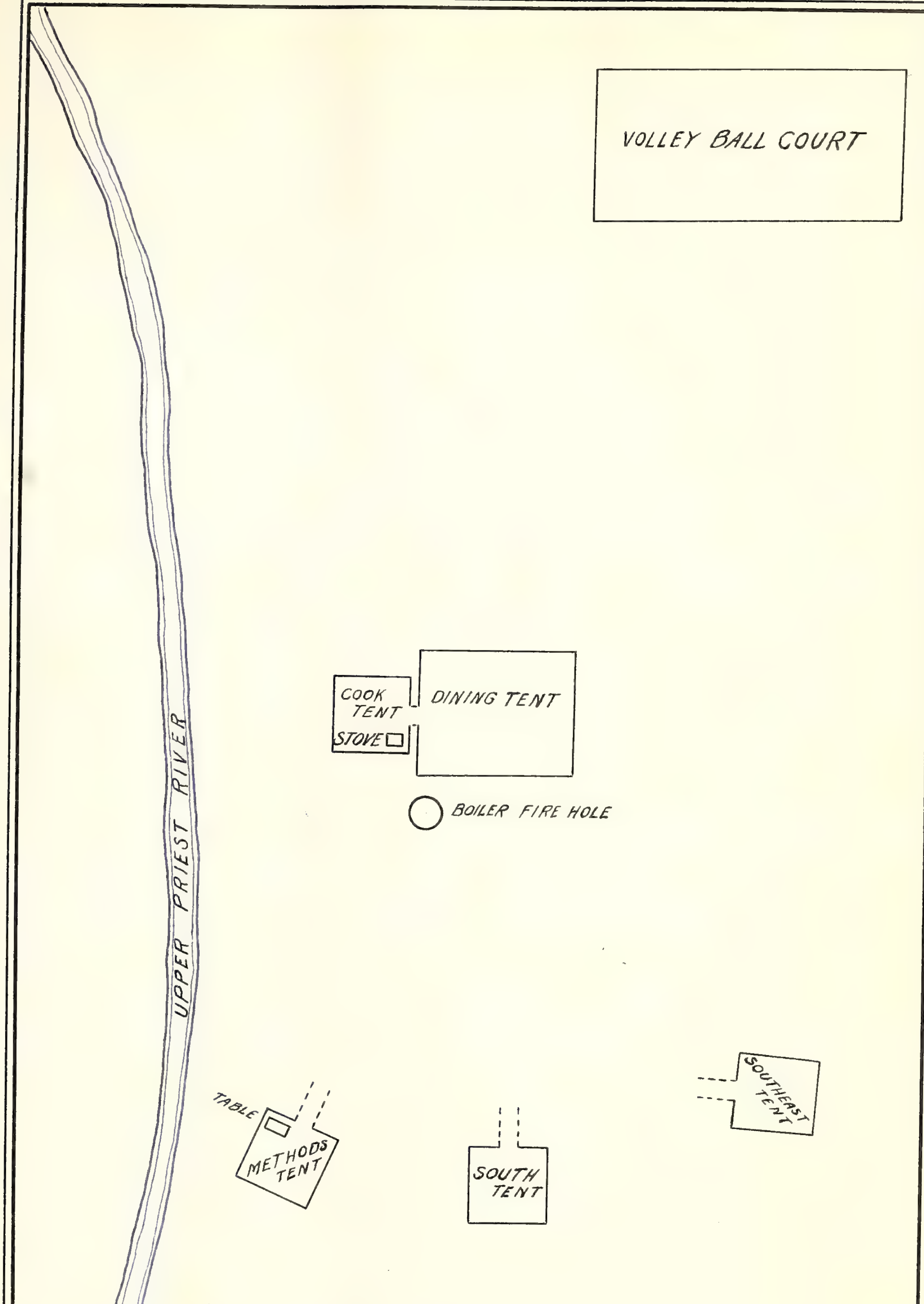
Plots were not laid out and the areas were studied merely in a general manner.

III. Results of Study

The site of 1924-1925 Camp One is in the valley of Upper Priest River, about 12 miles north of the Upper Lake. It is situated on the alluvial terrace lands at the river bank (not subject to overflow) beneath an overmature stand of cedar and hemlock. The terrace is about eight feet above the actual river level. This timber stand contains no *R. viscosissimum*, but has some *R. lacustre* in the wet openings.

Camp clearing and trampling had completely removed and destroyed all the duff from the ground areas studied here. Mineral soil, which was thus exposed over all the areas studied, was then covered in places with gravel dug from the stream bed.

A sketch on file in the Spokane office gives the general location of the various Ribes locations (Map No. 2).



MAP NO. 2
CAMP I UPPER PRIEST RIVER
Scale: 2" = 1 Ch.
March 1927

The site of the cook tent was first studied.

One R. viscosissimum 1926 seedling with .1 of a foot of live stem had germinated 2 feet west of the stove, inside the tented area.

One R. viscosissimum 1926 seedling with .15 of a foot of live stem 10 feet east of stove, under table awning area.

One R. viscosissimum 1926 seedling with .05 of a foot of live stem 3 feet southwest of boiler fire hole, outside of the tented area.

One R. lacustre 1926 seedling with .1 of a foot of live stem 15 feet northwest of stove inside the tented area.

This situation probably had 30% sky light and 7% sunlight.

The tent area occupied in 1925 by the methods crew and by C. C. Epling of the ecology project was next studied. Many seedlings of R. viscosissimum and R. lacustre were found around the work table in river gravel which was taken from the stream bed and dumped over the floor to hold down the dust. Most of these seedlings are scattered singly over the gravel, but there are three clumps of R. lacustre which appear to have probably come from single fruits, and two clumps of R. viscosissimum probably of similar origin. Probably 50 R. viscosissimum and 100 R. lacustre are growing in this gravel-covered portion of the methods tent. C. C. Epling gathered and sorted many Ribes on this table. This situation probably has 40% skylight and 10% sunlight.

The south tent also had river-bed gravel on a part of the floor. One R. viscosissimum and two R. lacustre were growing in the gravel. This situation probably has 20% skylight and 1% sunlight

The southeast tent also had a small graveled area. No Ribes were found. This situation probably had 5% skylight and ½% sunlight.

All of the growing Ribes seedlings were on areas which were used in 1925. No Ribes were found on areas which had not been used in 1925. All of the duff on these sites had previously been destroyed by repeated tramping.

The volley-ball court showed no Ribes germination, though gravel had been spread over considerable of this area. This site probably had 5% skylight and ½% sunlight.

This camp was situated in a timber stand which was absolutely without R. viscosissimum, but R. lacustre were scattered along the river bank.

The light percentage figures are only relative, and represent merely an estimate of the facts.

The 1924 Camp Two at Lime Creek was carefully examined for germinated Ribes. Two R. lacustre plants of 1925 origin were found growing beside the old fire box. No other Ribes were found (except on the ecology germination plots.)

The 1924-1925 Ecology Camp at Lime Creek was also observed carefully. On the ground where all the sorting, counting, experimenting and wrapping of specimens and seed had been done by the ecology crew in 1924 and 1925, many 1926 seedlings of both R. viscosissimum and R. lacustre literally covered parts of the ground. Seedlings of both species were found less abundantly around the remainder of the campsite. This campsite is on ground which had previously no R. viscosissimum, although R. lacustre were common.

All of the Ribes germination at these old campsites is on exposed mineral soil. Much of the germination is on gravel removed from the stream bed and dumped on the ground. All of the campsites are situated in areas which are absolutely without R. viscosissimum, and yet R. viscosissimum germination is almost as common as R. lacustre germination.

IV. Summary

Many R. viscosissimum and R. lacustre seedlings were found growing on the ground occupied by campsites for blister rust activities during the two previous years. All germinated seeds are on exposed mineral soil. These germinated seeds appear to increase in number as the amount of light is increased.

The origin of the seeds which have germinated on these sites is unknown. Introduction and distribution of these seeds by rodents is deemed improbable because of the apparent relationship between human activities of the previous years and the location of most of the germinated Ribes.

It appears most likely that much of this germination has resulted from seeds which have been carried by human agencies, this germination being particularly abundant at the several points where members of the ecology personnel collected and sorted the Ribes seeds for later use.

Viability of Ribes Seeds

I. Purpose of the Study

The purpose of this study is to learn more about what factors influence and control the viable dormancy and the germination of Ribes seeds.

II. Methods of Study Used

At the University of Idaho, laboratory germination of Ribes seeds under different temperature condtions is being attempted. Each is kept constant at all times by an automatic oven control.

Collected mixed seeds of unknown identity which have been sifted from the soil and duff beneath a mature Ribes-free white pine stand have also been planted.

These germination studies of Ribes seeds are being carried on by Professor E. E. Hubert of the Forestry Department of the University of Idaho.

Other germination studies by the Forestry Department of the University of Montana, under the direction of Professor Dorr Skeels, are in progress.

III. Results of the Studies

No report on laboratory germination can be made at this time.

A study and bulletin entitled "The Vitality of Buried Seeds" (Journal of Agricultural Research, volume XXIX No. 7, October 1, 1924 Key No. G-466) lends credibility to the belief regarding the long viable dormancy of Ribes seeds. However, Ribes seeds were not included in this study, so that all direct evidence is lacking.

The manner and time of most Ribes germination, following either fire or logging, as it does, lends further strength to the belief that the viable dormancy of Ribes seeds may be much longer than was previously thought possible.

Further field studies are necessary for complete proof regarding the actual length of time that dormant Ribes seeds may remain viable.

IV. Summary

Actual experimental results are incomplete, and no report can be made at this time.

Burn Studies

I. Purpose of the Study

In the summer of 1923, while engaged in field studies of Ribes for the Western Office of Blister Rust Control, the writer made a number of observations which were rather of a revolutionary nature.

Considerable seeds of [illegible] identity have been sifted from the soil and [illegible] are [illegible] have been [illegible].

These [illegible] studies of these [illegible] are [illegible] by Professor [illegible] of the Forestry Department [illegible].

[illegible] by the Forestry Department of the University of Montana, under the direction of Professor [illegible], are in progress.

III. [illegible]

A report on [illegible] at this time.

A [illegible] (Journal of Agricultural Research, volume XLI No. 7, October [illegible] [illegible]) [illegible] fibers [illegible] included in this study, [illegible] in Louisiana.

The [illegible] fiber [illegible] strength [illegible] fibers [illegible] previously [illegible].

[illegible] for [illegible] results.

IV. [illegible]

[illegible] results are incomplete, and [illegible] at this time.

[illegible]

1. [illegible]

In the [illegible], [illegible] studies [illegible] for the [illegible] Control, the [illegible] of the [illegible] rather [illegible].

These observations did not agree with the accepted theory and practice. This material was merely mentioned at that time but was not incorporated into the office report.

The writer has been adding to these observations in a small way since that time, but not until the past summer has he had an opportunity to substantially enlarge upon these previous data.

This different thought regarding the life history of Ribes was presented to an ecology conference at the Spokane office on July 26th, 1926 and this conference decided that the writer should devote the remainder of the field season colecting data for substantiation of the theory presented to the conference.

Briefly, the thought to be proven follows: R. viscosissimum generally appears following forest fires, and it usually occurs only in even-aged stands.

Practically all distribution of R. viscosissimum seeds occurs by gravitational aid. The seeds fall from the bushes during the many fruiting years of the average plant, then they lay dormant in or beneath the duff ground cover for some indefinite period. Usually, the timber growth crowds out the R. viscosissimum bushes within about 20 years following the fire, and the production of Ribes seeds ends. However, the accumulated R. viscosissimum seeds of several years crops lay in waiting for proper germination conditions. This dormant period may apparently be the length of time required to produce a merchantable stand of timber.

These R. viscosissimum seeds will not germinate at all so long as the duff mantle (built up during the growth of this timber stand) remains intact. The shade of the timber itself also serves as an insulator against Ribes. The only ways in which these insulators against germination are removed from large areas, are by fire and cutting. The fire generally removes both insulators simultaneously, although this means where it is severe, is so hot that it may destroy the dormant Ribes seeds that are in waiting for germination conditions. Removal of the timber cover by logging does not so thoroughly open up the ground for Ribes germination as does the fire. Only where the duff is disturbed by the several activities of logging, can germination start. These places are chiefly where trees have hit the ground, where brush has been dragged piled and burned, and where logs have been dragged up to the skidways.

Apparently, the R. viscosissimum seeds will not germinate generally except upon the removal or destruction of the duff. The light factor, while not so absolute in its control, appears to play an important part.

Most of the studies made during the 1926 season center around the germination and growth of R. viscosissimum, with lesser emphasis on associated species of Ribes.

W175.
Effect of forest fire on vegetation. The white string marks the extreme edge of a burn at Meadow Creek, Idaho. This fire occurred during the summer of 1924. The unburned area, above the string, shows the original forest floor covering of ferns, twinflower (Linnaea borealis), Miner's Lettuce (Claytonia sp.), Dogwood (Cornus canadensis), etc. No Ribes were found. The burned area, below the string supports a flora of Fireweed (Epilobium angustifolia), Thimbleberry (Rubus parviflorus), and Ribes. A nearby strip shows Ribes at the rate of 11,484 R. viscosissimum and 2,194 R. lacustre per acre, of 1925 and 1926 germination. The maximum size of R. viscosissimum was 1.8 feet in height with 10.4 feet of live stem; for R. lacustre, 2.2 feet in height with 2.5 feet of live stem.

II. Methods of Study Used

Small burned and cutover areas, situated within white pine timber areas of all conditions, were examined.

Strips extending across the burned and into the unburned area on either side, together with sufficient cross-strips to complete a graphic picture of the burn, was the ideal sought. Some of the burned areas were thus completed, and others were not so completely studied.

The strips examined were usually one-half rod wide, though a few strips of one rod wide and a few of two rods width were examined. Some burns were studied by means of plots only, and others by both strips and plots.

Table No. 1 and map No. 1 show the method of recording data on these areas. This data covers Pierce Burn No. 2.

Additional observational notes and records of miscellaneous character were made whenever special conditions observed warranted different mention.

Conditions in the adjoining unburned timber areas were also carefully studied and recorded for comparative purpose.

A very briefly stated summary of general conditions within and adjoining each area studied is given herewith, together with a tabular summary of the several areas studied. (Table 2.)

Meadow Creek Burn No. 1

This area is in the NW$\frac{1}{4}$-NW$\frac{1}{4}$, Sec. 14, T. 42 N. R. 3 W. Boise Meridian. The north edge of strip one is at the west edge of the valley, just south of the National Forest Boundary.

This burn is on a steep easterly-facing slope adjoining the valley of Meadow Creek. The area is a compound 1924-1925 burn within a mature timber stand of from 100 to 160 years of age. The stand is Ribes-free, and is practically free of all underbrush. R. lacustre is common in the valley at the base of the slope, but not above the lower part of the burned area. In the burned area, R. viscosissimum are scattered generally and R. lacustre are very abundant on the lower slope of the hill, There are 1928 R. viscosissimum per acre, 846 R. lacustre per acre and 13 G. inermis per acre.

. This burn was stripped and cross-stripped to obtain this data, .52525 of an acre being examined in detail.

Table No. 1.

Pierce Burn No. 1 – Strip 1.

Ribes No.	Ribes Species	Chain & Rod	Germination Year	Ht. of Bush in Feet	L.S. of Bush in Feet	Dead Stem of Bush in Feet	New Growth of L.S. in Feet	Special Notes
1	visco.	1-1	1922	.8	1.8	.2	.6	In heavy brackes and grass.
2	visco.	1-1	1922-23	.6	.6	.3	.5	
3	visco.	1-1	1922-23	.45	.50	.3	.4	
4	visco.	1-1	1922	.5	.5	.25	.3	2" N. of No. 3.
5	visco.	1-1	1923 or older	.4	.4		.1	2" .. of No. 3.
6	visco.	1-1	1923 (?)	.3	.3	.05	.2	1" N. of 5" dead white pine.
7	visco.	1-1	1922	.30	.75	.12		
8	visco.	1-1	1922	.25	.25	.00	.05	On N. edge 8" dead white pine.
9	visco.	1-1	1922	.6	1.2	.5	.1	Nipped back this year.
10	visco.	1-1	1922	.4	.9	.1	.1	
11	visco.	1-1	1922	.3	.4		.1	1' N. of No. 10.
12	visco.	1-1	1922	.4	.6		.15	1' N.W. of No. 8
13	visco.	1-1	1922	.35	.35		.02	
14	visco.	1-1	1922	.35	.7	.15	.1	
15	visco.	1-2	1922	.5	.5		.15	
16	visco.	1-2	1922	.45	.6	.45	.05	
17	visco.	1-2	1922 (?)	.3	.45	.2	.1	1' N. of No. 16.
18	visco.	1-2	192-(?)	.2	.2	.45	.12	
19	visco.	1-2	1922 (?)	.2	.2	.02	.03	
20	visco.	1-2	1922	.3	.5	.15	.19	1' N. of No 18.
21	visco.	1-2	1922	.25	.4	.10	[illegible]	1.5' N. of No. 23.
22	visco.	1-2	1922	.3	.5	.1	[illegible]	
23	visco.	1-2	1922	.6	1.0	.5	.4	
24	visco.	1-2	1922 (?)	.6	.5	.5	.15	
25	visco.	1-2	1922	.25	.12	.4	.01	
26	visco.	1-2	1922	.15	.3	.1	.1	
27	visco.	1-2	19-	.5		.45		
28	visco.	1-2		.12		.12		
29	visco.	1-2	192- (?)	.2	.25			
30	visco.	1-2	1922	.2	.2	.15	.1	All in group 6" to 12" W. of 12" D.F. stump.
31	visco.	1-2	1922	.25	.3	.02	.01	
32	visco.	1-2	1922	.3	.2	.05	.05	
33	visco.	1-2	19-	.25		.25		
34	visco.	1-2	1922	.8	1.3	.3	.15	
35	visco.	1-2	1922	.25	.25	.15		With No. 34.
36	visco.	1-2	1922	.7	1.1	.1	.2	1' N. of No. 35.
37	visco.	1-2	1922	.3	.45	.15	.1	
38	visco.	1-2	19-	.28		.28		
39	visco.	1-2	1922	.15	.15	.12	.01	
40	visco.	1-2	19-	.25		.25		With No. 37.
41	visco.	1-2	1922	.45	.30	.02	.1	
42	visco.	1-2	1922	.25	.22	.1	.01	
43	visco.	1-2	1922	.2	.38	.2	.35	1' N. of No. 37.
44	visco.	1-2	1922	.2	.2	.08	.01	With No. 43.
45	visco.	1-2	1922	.3	.3	.12	.01	1' NW. of No 34.
46	visco.	1-2	1922	.25	.25	.1	.01	
47	visco.	1-2	1 22	.2	.15	.12	.05	With No 46.
48	visco.	1-2	1922	.3	.5	.1	.01	1' NW. of No. 45.
49	visco.	1-3	1922	.4	.3	.15	.1	8" W. of No 48.
50	visco.	1-3	1922	.2	.4	.2	.12	8" W. of No 48
51	visco.	1-3	1922	.4	.4	.12	.05	
52	visco.	1-3	1922	.6	.4	.03	.01	
53	visco.	1-3	1922	.35	.5		.08	
54	visco.	1-3	1922	.25	.25	.05		Porch 8" N. of No. 50.
55	visco.	1-3	1----	.2		.4		
56	visco.	1-2	19---	.15		.15		
57	visco.	1-3	1922 (?)	.2	.2		.01	
58	visco.	1-3	1922	.6	.75	.1		
59	visco.	1-3	1922	.25	.25		.05	
60	visco.	1-3	1922	.5	.5	.05	.01	
61	visco.	1-3	1922	.3	.3	.01	.08	With No. 60.
62	visco.	1-3	1922	.8	1.0	.25	.2	
63	visco.	1-3	1922	.3	.3	.1	.01	
64	visco.	1-3	1922	.45	.45	.1	.12	
65	visco.	1-4	1922	.3	.5	.1	.8	
66	visco.	1-4	1922	.3	.6	.2	.12	
67	visco.	1-4	1922	.5	1.0	.4	.2	Together.
68	visco.	1-4	1922	.7	1.2	.7	.1	
69	visco.	1-4	1922	..25	.25		.01	
70	visco.	1-4	1922	.3	.3	.15	.08	
71	visco.	1-4	1922	.3	.45		.08	
72	visco.	1-4	1922	.22	.45	.4	.01	With No. 71.
73	visco.	1-4	192- (?)	..35	.45	.02	.08	
74	visco.	1-4	1922 (?)	.6	1.2	.4	.15	
75	visco.	1-4	1922	.5	.75	.1	.03	With No. 74.
76	visco.	2-1	1922	.45	.45	.07	.02	
77	visco.	2-1	1922 (?)	.4	.4		.01	
78	visco.	2-1	1922 (?)	.25	.25	.25	.01	3" NW. of No. 85.
79	visco.	2-1	19- (?)	.25	.30	.4	.12	
80	visco.	2-1	1922	.9	2.5	.7	.5	
81	visco.	2-1	1922	.4	.42	.1	.05	
82	visco.	2-1	19- (?)	.3	.6	.08	.5	
83	visco.	2-1	1922 (?)	.7	1. 2	.2	.2	
84	visco.	2-2	1922	.55	.5	.5	.01	
85	visco.	2-2	19- (?)	.6	.9	.4	.05	
86	visco.	2-2	19-(?)	.7	.7	.2	.1	

Pierce Burn No. 2 (Strip A)

1	visco.	A-1	1922	.5	1.40	.2	.2	1' E. of 11" D.F. Stump.
2	visco.	A-1	1922	.4	.7	.3	.18	4" E. of 11" D.F. Stump.
3	visco.	A-1	19-(?)	.5	.7	.1	.2	40" E. of 11" D.F. Stump.
4	visco.	A-1	1922	.35	1.0	.6	.05	6 " NE of No. 2.
5	visco.	A-1	1922(?)	.6	1.5	.5	.5	3" N. of No. 4.
6	visco.	A-1	1921-22(?)	.2	.25	.08	.1	15" N. of No. 3.
7	visco.	A-1	1922	.3	.40	.2	.02	2' N. of above Stump.
8	visco.	A-1	1922	.6	.6	.7	.25	6" NW of No. 7.
9	visco.	A-1	1922	.3	.48	.15	.2	On bank above road.
10	visco.	A-1	1922 or 23	1.8	1.9	.8	.9	6" E. of No. 9.
11	visco.	A-1	1922 (?)	.8	.65	1.2	.25	2" N. of No. 2.

Pierce Burn No. 2 (Strip B)

1	visco.	B-1	1922	.3	.1	.5	.01	
2	visco.	B-1	192-(?)	.3	.3	.18	.01	
3	visco.	B-1	1923 (?)	.2	.18	.2	.01	
4	visco.	B-1	1922	.3	.35	.1	.02	4" SW of No. 3.
5	visco.	B-1	1922	.3	.5	.2	.02	
6	visco.	B-1	19 (?)	.2	.2	.3	.01	6" W. of No. 5.
7	visco.	B-1	19 (?)	.3	.3	.3	.03	12" W. of No. 6.
8	visco.	B-1	1923 (?)	.25	.25	.12		15" SE of No. 7.
9	visco.	B-1	1922 (?)	.2	.3	.05	.01	
10	visco.	B-1	1922	.2	.12	.1	.10	2' N. of old road.

Pierce Burn No. 2 (Strip C)

1	visco.	C-1	1922	.25	.45	.45	.04	
2	visco.	C-1	(?)					
3*	visco.	C-1	1920	3.3	7.5	1.5	2.5	Under south edge of down log. On disturbed ground where falling tree plowed ground.
4*	visco.	C-1	1920					Under N. edge of small log. Pulled out to determine its age.

* Ribes 3 and 4 in opening in timber under north edge of large Service Berry bush, but with considerable afternoon sunshine. Building of the later of the two roads here probably opened it up sufficiently for these Ribes. They appear very definitely to be 1920 germination, so the road was probably built in 1919 or 1920, and the wedge area was burned a year or so later.

Pierce Burn No. 2. (Strip D)

1	visco.	D-1	1922	.5	.5	.25	.12	
2	visco.	D-1	1922	.35	.25	.03	.01	
3	visco.	D-1	1922	.3	.7	.45	.01	
4	visco.	D-1	1922	.35	.45	.2	.03	
5-6	visco.	D-1	1922	.35	.35	.05	.01	Together. Each similarly injured by grazing.
7	visco.	D-1	1922	.35	.5	.05	.05	
8	visco.	D-1	1922	.35	.5	.02	.05	
9	visco.	D-1	1922	.30	.42	.08	.10	
10	visco.	D-1	1922	.4	.4	.4	.02	

Meadow Creek Burn No. 2.

This area is located in the NW$\frac{1}{4}$-SW$\frac{1}{4}$, Sec. 11, T. 42 N. R. 3 W. Boise Meridian. It is 32 chains north of the National Forest boundary, and one chain west of the west edge of the valley.

The area was burned in September 1925. Previous to this fire, it was a reproduction thicket of about 25 to 27 years of age (1898 burn.) It still had old bushes of R. viscosissimum and R. lacustre in the openings. This reproduction thicket, where unburned, probably has from 70 to 100 Ribes per acre, approximately 70% R. viscosissimum and 30% R. lacustre.

The area is on a steep easterly slope (the west side of the valley of Meadow Creek.)

The burn of September 1925 has Ribes of 1926 germination at the rate of 36000 R. viscosissimum and 1080 R. lacustre per acre. All of these newly germinated Ribes are either at the very edges of the burn or on lightly burned portions of the ground. None are on heavily burned spots.

This area was studied by means of a single half-rod strip crossing a narrow neck of this burn from north to south, and supported by additional general observational notes of E. E. Hubert, Thomas Large and the writer.

Emida Burn No. I.

This area is located 2 chains south of the W$\frac{1}{4}$ corner of Sec. 21, T. 43 N., R. 2 W., Boise Meridian. The area is very inaccessible and difficult to find.

This area burned in 1923. Most of this area is but lightly burned, leaving much of the crown canopy still alive and with numerous islands of unburned ground, particularly in the south half of the area. The burn is in the center of an extensive white pine stand.

Blister rust reconnaissance shows the region as having no R. viscosissimum. We found 3 R. viscosissimum bushes about three miles distant, but no other indication of its presence. Reconnaissance records show 4 R. lacustre per acre, mainly along draws.

The Ribes show a general distribution within the stripped portion of the area. The northerly part of the burn has about 100 Ribes per acre, the southerly part about 10 per acre, with an average of 51 per acre. About two-thirds of these are R. viscosissimum and about one-third are R. lacustre. Strips, cross strips and plots totaling 1.455 acres were examined in detail.

Hog Meadow Burn No. I.

The area is located in the east part of lot 10, Sec. 3, T. 40 N., R. 1, W., Boise Meridian. It is about 200 yards northwest of the Potlatch Lumber Company camp, and the south end of the strip is about 20 feet north of the logging railroad.

This study was made of a logged slashing area, which was partly broadcast burned and party piled and burned. Separation of the areas burned by each method proved impossible, and the data is assembled as of a single area.

The area is on a gentle southerly slope, which supports the cull timber of a white pine stand. The area was Ribes-free, there being no Ribes on adjoining unlogged lands.

The slash was burned in November 1925, and in May, 1926. There are no Ribes in the unburned strips and islands within the area studied. There were 8200 R. viscosissimum seedlings per acre of 1926 germination in the skid trails and other spots where mineral soil has been mechanically exposed. There are 77 R. viscosissimum per acre of 1925 germination and 423 R. viscosissimum per acre of 1926 germination on the area burned in November, 1925. There are 250 R. viscosissimum per acre of 1926 germination on the area burned in May 1926.

Observations over the entire burn supported by a strip (half rod wide) extending for 6 chains through the area, constitute the study of this area.

East Fork Potlatch River Burn No. I.

The area is in the NE$\frac{1}{4}$-SW$\frac{1}{4}$ Sec. 6, T. 40 N., R. 1 E., Boise Meridian.

This area is located on the north side of the Bovill-Elk River highway, about 100 feet from the road. The area is about 200 yards southeast of the bridge which crosses the East Fork of Potlatch River.

The surrounding timber stand has been logged. It is Ribes-free white pine type. The slashing and other litter remaining after logging was partly piled. It was then burned early in the spring of 1926. The burn was very uneven with some spots heavily burned, some lightly burned, some barely scorched and other portions remaining entirely unburned.

Unburned portions of this area show 130 R. lacustre and 44 R. petiolare per acre where the duff has been disturbed, but the undisturbed areas of the unburned forest floor have no Ribes. The above Ribes are of mixed ages, most of them starting before the fire occurred.

The burned portions of the area have an average stand of 1051 R. viscosissimum 1926 seedlings and 282 R. lacustre 1926 seedlings per acre. Twenty-six R. lacustre per acre had lived through the fire on the burned area.

On the skid trails and other areas where duff was mechanically removed, 1714 R. viscosissimum per acre equally divided into 1, 2 and 3 year old bushes, were found.

Studies in this area consisted of one east to west strip (half-rod wide) from within the unburned timber across the burn into the unburned area on the opposite side.

East Fork Potlatch River Burn No. II.

This area is about ½ mile farther from Bovill toward Elk River, Idaho on the north side of the highway, than East Fork Potlatch River Burn No. I. The strip begins at a logging road leading northeast from the main highway.

It is within a logged area of white pine type, with the slashing apparently burned late in 1925. Most of the ground was quite heavily burned into the mineral soil. Very little vegetation is yet showing on the burned area.

The adjoining unburned timber areas show scattered old R. viscosissimum bushes. R. viscosissimum of 1926 germination had started on the burned ground at the rate of 2000 per acre, R. lacustre of 1926 origin at 133 per acre.

This area was studied by a single strip (half-rod wide) one chain long, supported by observational notes regarding general adjoining conditions.

Oviat Burn No. I.

This area was not located by section. The road to Park, Idaho from the Bovill-Elk River road leaves the latter about 8 miles southwest of Elk River. After following the Park road about 3 miles from the main highway, a road forks is encountered. (The left hand fork is but a little traveled although it is a plain road. It leads steeply downhill from the forks to the bottom of a deep draw, crosses this draw and joins a completed railroad grade.) Keep on the main Park road 14.8 chains beyond this road forks to an old pile of skidded logs. The burn is 6 chains south 80 degrees east from this point.

This small spot burn occurred in 1925. It covered only about one-fourth of an acre before it was trenched and stopped.

The area is on a gentle easterly slope in a mature stand of Ribes-free white pine type. The surrounding timber supports very little undergrowth. The ground is generally deeply covered by duff. Scattered unburned islands of the original forest floor are scattered through all parts of the burn, and about 60% of the crown canopy was not killed by the fire.

The opening made by the burn is also so small that very little sunlight reaches the ground within the area.

The entire burn was carefully searched for Ribes. No old Ribes bushes were found either inside or outside the area. Two R. viscosissimum, 1926 seedlings, were found, one on the inside of the fire trench, and one on some exposed mineral soil beside an upturn.

Oviat Burn No. II.

The area was not located by section. The Park road forks from the Bovill-Elk River road about 8 miles from Elk River. About 3 miles toward Park on this road an untraveled branch road forks to the left across a draw and 50 yards distant, a railroad grade is found. Follow this grade about one mile to its end and strip No. 1 is about 100 feet north of the grade.

This area was burned in 1925. The fire was very severe in the center of the burned strip, and decreasingly intense toward either edge.

The area is a gentle southerly slope within a mature stand of white pine type. Some logging operations had been carried on within the area, though the fire was so severe that only locally can trace of previous conditions be found.

Old roads and trails had crossed the area of the fire, and parts of these previous openings were not burned over. Old R. viscosissimum bushes were scattered along these openings within the area, but were not present in the virgin portions of the stand.

The burn was studied by a single strip, extending from within the unburned area on one side of the burn, into the unburned virgin timber on the other side.

There are about 4250 R. viscosissimum per acre across the entire burned portion, but these are very much localized.

Where the strip was begun, R. viscosissimum of 1926 germination is growing in the fire trench at the rate of 4,800 bushes per acre.

Beginning at the inner edge of the fire trench, the first half chain strip (one half-rod wide) has 4960 R. viscosissimum per acre. The second half-chain has 1600 R. viscosissimum per acre, while the next two chains of strip, which were in the hottest part of the fire, have no R. viscosissimum germination. Here an unburned roadway was crossed, and adjoining this road, the fire was so much less severe that for the next half-chain of strip, there are 4800 R. viscosissimum per acre. The next seven half-chain lengths have 160, 4480, 960, 7520, 6720, 10240, and 16000 R. viscosissimum per acre respectively.

The last half-chain listed ends at the fire trench. The fire trench at this edge has 66000 R. viscosissimum per acre.

A few R. lacustre of inconsequential importance were encountered in various parts of this strip, though they are nowhere abundant.

Pierce Burn No. I.

The area was not located by section, but adjoins the new Forest Service road to Bungalow about ½ mile from Pierce, Idaho on the right (upper) side of the road. The area is a gentle southwesterly slope immediately adjoining the road and is only about 1/100 acre in extent. It was probably burned in 1925.

The timber is an open stand of lodgepole pine immediately adjoining and within a general white pine stand. No Ribes were found in the adjoining unburned area.

The burn was light on approximately 2/3 of the area, burning all of the duff on about 1/3 of the area only. The entire area of the burn was carefully searched for Ribes. 900 R. lacustre, 1926 seedlings, per acre were scattered over the burn. These seedlings average about .25 inch in height. No R. viscosissimum was found.

Pierce Burn No. II.

This area is about ½ mile in a northeasterly direction from Pierce, Idaho. It is on the old Bungalow road, about 500 yards beyond the Pierce schoolhouse. Its situation and condition is shown on map No. 1 and Table No. 1. It is within a dense stand of 40-60 year old white pine.

The surrounding timber stand is Ribes-free. At least an acre surrounding the area was carefully searched for Ribes.

Some years ago, the old road was changed to eliminate several steep rises, and at the same time the timber growth was slashed on either side to more effectively open the roadway. A small wedge of this slashing lays between the new road and a loop of the old road, and completely surrounded by the two loops of the road. The slashing on this small wedge of land, in some manner, was burned, probably in 1921. All other slashed areas along the road remain undisturbed and are Ribes-free.

The small burned area has 5336 R. viscosissimum per acre, apparently all of 1922 germination. There is very little other vegetation. Most of the Ribes have been nipped back by grazing. Practically all of the bushes have from 2" to 4" of roots exposed, due to having been partially pulled out of the soil by the grazing of stock.

Lakeview Cutover No. I.

This area is in SE-SW$\frac{1}{4}$, Sec 3, T. 53 N., R. 1 W., on the south shore of Lake Pend Oreille, and by compass is due true south from Cape Horn, on the west side of the lake.

The area is at the base of the slope and is just above high-water line of the lake shore.

All timber cover has been slashed on an area of approximately 1/10 acre in making opening for wire on telephone line. The timber growth which was slashed was entirely young stuff, and no overhead shade remains. The duff was practically undisturbed, and the slashing lays where it fell, so that soil conditions are practically as they were before the change occurred.

This slashing, by the appearance of the small stumps remaining, took place several years ago, but no Ribes are present on the area. Neither are they present on the timbered area immediately adjoining.

Conditions here are almost identical with those which prevail on Lakeview Burn No. 2 about a mile to the eastward except that here the slashing and duff remain undisturbed and the R. viscosissimum are not present.

Lakeview Burn No. I.

This area is located in the SW¼-SE¼, Sec. 4, T. 53, N., R. 1 W., and extends southward into the NW¼-NE¼, Sec. 9, T. 53 N., R. 1 W. The plots occur at the end of each chain, extending southward from the west end of the lime plant.

On August 5, 1925, fire broke out in the lime plant of the International Portland Cement Company, about one mile west of Lakeview, Idaho, and in five minutes (the manager's version) had swept through the plant, into and over the entire northwest slope about the mill. It then extended more slowly in several directions over adjoining parts of the mountain.

Scattered mature R. viscosissimum were seen around this physical development, beside cuts and along roads and trails. No R. viscosissimum was seen within that portion of this timbered slope which remained unburned and in the natural condition.

The entire northerly slope is a very steep rock slide, only partially covered with soil. The loose mantle is so unstable that the rock beneath one's feet slides about 50% of the time. There is very little fine-textured soil mantle, and that only in depressional spots of varying extent.

Since the fire occurred there is no live timber growth, although the greater part of the charred remains is still standing. These standing skeletons are all charred from top to bottom, thus indicating the fierceness and speed of the fire.

The present vegetation consists chiefly of Epilobium, Ribes, Rubus, and Opulaster. R. viscosissimum seedlings of 1926 germination are very general but there is practically no R. lacustre.

The fire left practically no duff but was unable to burn deeply into the soil because of its patchy and rocky character. It was estimated that:

20% of the surface is now plant-covered soil,
30% of the surface is now bare slide rock,
50% of the surface is now bare soil.

A zig-zag course was run up the hill through this burned area, and at the end of each chain traveled, a 1/1000 acre square plot was counted for Ribes. Eight such plots were recorded. The results were as follows:

Plot	No. Ribes Bushes	Species	Year of Germination	Average Height in feet	Average Live Stem in feet
1	5	R. visco.	1926	0.5	0.5
2	7	R. visco.	1926	0.2	0.2
3	5	R. visco.	1926	0.4	0.4
4	2	R. visco.	1926	0.6	0.7
5	4	R. visco.	1926	0.3	0.3
6	3	R. visco.	1926	0.3	0.3
6	1	R. lacustre	1926	0.2	0.2
7	0	------	----	---	---
8	20	R. visco.	1926	0.1	0.1
	5.75	R. visco.	1926	.2	.2
Average	0.13	R. Lacustre	1926	.2	.2

Although only smaller bushes were encountered on these plots, many 1926 R. viscosissimum 1.0 to 1.5 feet high were seen, several 2.0 feet high were found, and one bush with a height of 2.2 feet and with 3.2 feet of live stem was found.

R. lacustre is noticeably absent over most of the area, the one listed in the table being the only one seen on the entire burn.

Summary

Burned August 5, 1925.

No mature R. viscosissimum encountered in unburned timber area.

R. viscosissimum seedlings average 5750 per acre.

Lakeview Burn No. II.

This area is located either in the NE$\frac{1}{4}$-NW$\frac{1}{4}$ or in the SE$\frac{1}{4}$-NW$\frac{1}{4}$, Sec. 9, T. 53. N., R. 1 W., but without actually surveying out the forty lines, it cannot be more definitely located.

This small spot-fire situated about one-half mile southwest of the International Portland Cement Company lime mill was studied. It is about 5 chains southwest of the southwestern-most cabin. The burn extended from high-water line on the lake shore up into the hillside timber. The burned area varies from 20 to 50 feet in width, extending directly up the hillside.

Neither R. viscosissimum nor R. lacustre were seen outside of the burned area. A very few G. irrigua were found on sliderock beside the lake shore in an adjoining unburned area.

The burn was not severe, although the duff was entirely destroyed over most of the area.

The burned area shows R. viscosissimum coming in at the rate of from 1000 to 10000 seedlings per acre. These seedlings are all from seed in 1926, although the seedlings have made a much smaller average growth than in the main burn nearer the mill. These seedlings are universally distributed over the burned area, though not of uniform abundance.

Athol Burn No. I.

This area is located in the $NE\frac{1}{4}$-$NE\frac{1}{4}$, Sec. 13, T. 53 N., R. 3 W., and is about 4 miles east of Athol, Idaho.

As you approach this burned area on the east-west road from Athol, the road leaves the green timber growth and extends between two burned areas. This burned area is flat sandy land which supports a moderately heavy growth of small lodgepole timber.

No Ribes were encountered in this burned area, except along the south edge adjoining the green timber growth.

A rough count of the Ribes encountered was made. Beginning at the edge of the green timber, and extending out into the burned area the count was recorded. The results of this approximate count follow:

First rod from unburned timber 30,000 to 40,000 Ribes per acre.
40% R. viscosissimum, 60% G. inermis.
Second rod from unburned timber 1500 Ribes per acre.
20% R. viscosissimum, 80% G. inermis.
Third rod from unburned timber 500 Ribes per acre.
100% G. inermis.
Fourth rod from unburned timber 60 Ribes per acre.
100% G. inermis.
Fifth rod from unburned timber 0 Ribes per acre.
Sixth rod from unburned timber 0 Ribes per acre.
Seventh rod from unburned timber 0 Ribes per acre.
Eighth rod from unburned timber 0 Ribes per acre.

The R. viscosissimum and G. inermis are abundant along the south and west edges of this burned area. The other sides of the burn were not studied.

Germination of both species appears to have been entirely in 1924. This determination was based on the following count.

Of 50 R. viscosissimum on which the age was taken, 47 gave 1924 origin, and 3 were listed as of doubtful age.

Eighty-two G. inermis were counted as to date of origin. Fifty-six of these were definitely of 1924 origin and 26 were of doubtful age.

Table No. II.

Burn Study of Ribes Germination.

Name of Burn	Date of Burn	No. of Strip or Plot	Total Area Examined in Acres	Exposure or Site	On Unburned Timber Area: No. Ribes per Acre of 1 year age	No. Ribes per Acre of 2 year age	No. Ribes per Acre of 3 year age	No. Ribes per Acre over 3 year age	No. Ribes per Acre all ages	Area Examined (in Acres)	On Undisturbed Slashing: No. R. per Acre of 1 year age	No. R. per Acre of 2 year age	No. R. per Acre of 3 year age	No. R. per Acre over 3 year age	No. R. per Acre all ages	Area Examined (in Acres)
Meadow Creek No. 1	1924-25	Strip 1	.225	S	17 V. 17 L.			34L.	17V. 51L.	.071						
Meadow Creek No. 1	1925	Strip 9B1	.0126	E						.0095						
Meadow Creek No. 1	1924-25	Strip 9A	.1	E						.025						
Meadow Creek No. 1	1924-25	Strip C	.1375	S												
Meadow Creek No. 1	1924	Strip D	.025	S						.01525						
Meadow Creek No. 1	1925	Strip E	.024125	NE						.016375						
Meadow Creek No. 1	1924	Strip 3	.001125	NE												
Meadow Creek No. 2	Sept. 1925	Strip 1	.015	E	1440 V. 800L.			480V.	1920V. 800L.	.00625						
Erica No. 1	1923	Strip 1	1.355	N												
Erida No. 1	1923	Plot 1	.1	NW												
Hog Meadow No. 1	Nov. 1925	Strip 1	.039	SW						.026						
Hog Meadow No. 2	May 1926	Strip 1	.016	SW												
East Fork Potlatch R. No. 1	Spring 1926	Strip 1	.03745	SW	22L. 44P.	86 L.	22L.		130L. 44P.	.0467						
East Fork Potlatch R. No. 2	Fall 1925	Strip 1	.0125	SW						.005						
Ovist No. 1	1925	Plot 1	1.307	S						1.0						
Ovist No. 2	1925	Strip 1	.09375	S				676V.	6787.	.010325						
Pierce No. 1	1925	Plot 1	1.01	SW						1.0						
Pierce No. 2	1921(?)	Strips 1, A,B,C,D	1.1223	W				2 V.	2 V.	1.0						0.1
[illegible] Cutover No. 1	Un-burned	Plot 1	.1	[illegible]												0.1
[illegible]review [illegible] No. 1	Aug. 5 1925	Plots 1 to 6	1.00	[illegible]						1.0						
Totals Averages			[illegible].81125		2.4 V. 1.7 L. .5 P.	0.9 L.	0.2L.	2.6[illegible]. .1L.	5.2V. 3.3L. .5P.	4.2[illegible]						0.2

Name of Burn	On Exposed but unburned Areas of Mineral Soil: No. Ribes per Acre that Germinated before uncovering of soil	No. Ribes per Acre that Germinated same year as uncovering of soil	No. Ribes per Acre that Germinated 1st year after uncovering of soil	No. Ribes per Acre that Germinated 2nd year after uncovering of soil	No. Ribes per Acre that Germinated still later	No. Ribes per Acre all ages	Area Examined (in Acres)	On Timber Areas having only Ground Cover Burned off: No. Ribes per Acre that Germinated before fire	No. Ribes per Acre that Germinated same year as fire	No. Ribes per Acre that Germinated first year after fire	No. Ribes per Acre that Germinated 2nd year after fire	No. Ribes per Acre that Germinated still later	No. Ribes per Acre all ages	Area Examined (in Acres)
Meadow Creek No. 1 (Strip 1)			514 V. 171 L.			514 V. 171 L.	.0175			160-200				
Meadow Creek No. 1 (Strip 9B1)										//				.003
Meadow Creek No. 1 (Strip 9A)		222 L.	9778 L.			10000 L.	.0045			//				
Meadow Creek No. 1 (Strip C)		667 V.	667 V. 2000 L.			1333 V. 2000 L.	.003			//				
Meadow Creek No. 1 (Strip D)										//				
Meadow Creek No. 1 (Strip E)										//				
Meadow Creek No. 1 (Strip 3)										//				
Meadow Creek No. 2										20-30				
Erica No. 1										160-200				
Erida No. 1										//				
Hog Meadow No. 1			8200 V.			8200 V.	.005			160-200				
Hog Meadow No. 2										//				
East Fork Potlatch R. No. 1		571 V.	571 V.	571 V.		1714 V.	.00175			120-160				
East Fork Potlatch R. No. 2										120-160				
Ovist No. 1				80 V.		80 V.	.025			120-160				.282
Ovist No. 2			30165V. 781L.			30165 V. 781 L.	.0025625			120-160				
Pierce No. 1										40-50				
Pierce No. 2										40-50				
[illegible] Cutover No. 1										160-200				
[illegible]review [illegible] No. 1										40-50				
Totals Averages		31 V. 17 L.	2192 V. 927 L.	30.V.		2293 V. 944 L.	.0595125							.285

Name of Burn	On Light Burns: No. Ribes per Acre that Germinated before fire	No. Ribes per Acre that Germinated same year as fire	No. Ribes per Acre that Germinated first year after fire	No. Ribes per Acre that Germinated 2nd year after fire	No. Ribes per Acre that Germinated Still later	No. Ribes per Acre all Ages	Area Examined (in Acres)	On Severe Burns: No. R. per Acre that Germinated Before fire	No. R. per Acre that Germinated same year as fire	No. R. per Acre that Germinated first year after fire	No. R. per Acre that Germinated 2nd year after fire	No. R. per Acre that Germinated still later	No. Ribes per Acre All ages	Area Examined (in Acres)
Meadow Creek No. 1 (Strip 1)	7 L.		1597 V. 7 in. 432 L.	22 V. 51 L.		1619 V. 7 in. 490 L.	.1365							
Meadow Creek No. 1 (Strip 9B1)														
Meadow Creek No. 1 (Strip 9A)	13 L.		667 V. 809 L.	14 L.		667 V. 866 L.	.0705							
Meadow Creek No. 1 (Strip C)		81 V. 14 L.	768 V. 14 in. 401 L.	14 V. 37 L.		863 V. 14 in. 452 L.	.1345							
Meadow Creek No. 1 (Strip D)			4550 V.	100 V.		4650 V.	.00975							
Meadow Creek No. 1 (Strip E)		9419 V. 1807 L.	2065 V. 387 L.			11484 V. 2194 L.	.00775							
Meadow Creek No. 1 (Strip 3)			889 V. 5333 L.			889 V. 5333 L.	.001125							
Meadow Creek No. 2	115 L.		36000 V. 915 L.			36000 V. 1030 L.	.00875							
Erica No. 1	1.5 L.	27 V. 14 L.	7 V. 1.5 L.			3[illegible] V. 17 L.	1.355							
Erida No. 1		30 V. 80 L.	10 V. 90 L.			40 V. 170 L.	.1							
Hog Meadow No. 1		77 V.	231 V.			308 V.	.026							
Hog Meadow No. 2		250 V.				250 V.	.016							
East Fork Potlatch R. No. 1	25 L.	1051 V. 282 L.				1051 V. 308 L.	.039							
East Fork Potlatch R. No. 2			2000 V. 133 L.			2000 V. 133 L.	.0075							
Ovist No. 1														
Ovist No. 2	70 V.		5662 V. 17 L.			5732 V. 17 L.	.0574[illegible]							.023375
Pierce No. 1			225 L.			225 L.	.01							
Pierce No. 2			5336 V.			5336 V.	.0223							
[illegible] Cutover No. 1														
[illegible]review [illegible] No. 1			5750 V. 125 L.			5750 V. 125 L.	.008							
Totals Averages	2 V. 3 L.	77 V. 22 L.	633 V. 102 L. 1 in.	3 V. 6 L.		714 V. 134 L. 1 in.	2.0101							.0234375

W217.
Spot burn, 35-40 years old, on southwest slope, Harvard-Deary road, Idaho. Timber stand outside of burn represents Dense Mature type, white pine, and contained no Ribes. Burn represents Open Reproduction type with many _R. viscosissimum._

Lakeview Rockslide No. I.

This area is situated about midway between Lakeview Burn No. 2 and Lakeview Cutover No. 1. It was not located by legal subdivision.

The area consists of approximately ½ acre with soil too thin to hold the unstable rockslide beneath it. One cannot walk across it without slipping the underlying rock. It was carefully examined for Ribes. Neither R. viscosissimum nor R. lacustre were found to occur. Five G. inermis were encountered along the lower edge of this area, just above high water line.

IV. Summary

Some general deductions regarding the germination of R. viscosissimum, and to a lesser extent of R. lacustre, can be made from the data of Table II.

Although all Ribes are generally absent from mature virgin white pine stands, the removal of the duff ground cover either by fire or by mechanical means, brings about the immediate germination of Ribes in large numbers. This germination usually occurs the first year after the fire or logging operation, although in some cases, the Ribes germinate the same year as the fire. The second year following the fire or logging usually sees very little germination, and there is practically no later germination. R. viscosissimum appears to entirely follow this scheme of germination, with R. lacustre showing marked tendencies along the same line.

Fire appears more universally successful as an aid to Ribes germination than does the mechanical uncovering of the soil. Intensely burned areas however, appear to be very effectively freed from Ribes germination. The table shows insufficient data to substantiate this, because the heavily burned areas were not sufficiently segregated in the 1926 field data to permit separate tabulation. Intense burns appear to have an equally prohibitive effect on the several species of native Ribes.

The tabular data on areas having the ground cover only burned off (crown canopy still overhead) indicate that light is a decided factor in the germination of Ribes, but that it is not of comparable importance with the duff factor.

All data collected indicate that on undisturbed slashings, that is where the duff mantle was not disturbed, there is no Ribes germination.

The tabulated data show some germination of Ribes on unburned timber areas, but upon closer study, practically every such Ribes found is within an inch or two of the edge of a burn, or within a foot or two of a fire trench, where the uncovering of the mineral soil and of the seed was so nearly complete that some germination became possible. More careful observations regarding these scattered germinations are necessary.

Leaf Area-Live Stem Ratio Study

I. Purpose of Study

The purpose of this study is to obtain definite information regarding the amount of leaf surface of Ribes bushes of various sizes and forms. The amount of leaf surface, and the height of the bush, are the factors which greatly influence the infecting power of a given Ribes bush.

II. Methods of Work Used

The first efforts along this line contemplated the use of the Caruthers linear scale for measuring areas of Ribes leaves. The scale was tried, however, and proved to have such errors in area that the writer began searching for another means of measuring said leaves. A circular concentric scale made of celluloid is the result of this search, the same foundational scale being usable for the leaves of Ribes of any species, the only difference being the set of areal figures for each species. The scale for *R. lacustre* is reproduced herewith.


12.10
11.15
10.25
9.37
8.53
7.74
6.99
6.27
5.59
4.95
4.35
3.79
3.27
2.79
2.34
1.94
1.57
1.24
.95
.70
.48
.31
.17
.08
.48
1.94
4.35
7.74
12.10

In developing this scale, 1000 leaves of R. lacustre from bushes of every size and form were each twice measured by planimeter. At the same time, the area of the circle which would entirely enclose the individual leaf was recorded. The average planimeter measurement of the 1000 leaves proved to be .616 of the average area of the circumscribed circle. Hence the R. lacustre scale has for its set of areal figures, areas which give in square inches, .616 of the area of each individual circle.

The R. viscosissimum scale was developed in a similar way, the areal figures on this scale being .697 of the circle area.

Scales for the other Ribes species have not yet been made, but will be made on the same basis.

III. Results of Study

The average factor is .616 for the 1000 measured R. lacustre leaves. Of these 1000 leaves, only 14 have a factor of over .700, and only 14 have a factor of under.520.

Of the 1000 leaves, 26 leaves were very much distorted in shape. These 26 misshapen leaves have an average factor of , .551. If these misshapen leaves had not been used, the average factor would have been .61763.

A check of the circle scale and of the linear scale was made on 31 leaves, with each leaf twice planimetered. The results of this test are shown in Table 3.

For the 1000 measured R. viscosissimum leaves, the average factor is .697. Of the 1000 leaves, only 14 leaves have a factor of over .796, and only 28 leaves have a factor of less than .596. The 1000 R. viscosissimum leaves included such misshapen leaves as were encountered in a field-run collection.

No check of the circle scale against the linear scale has been made for R. viscosissimum.

This scale can be used with nearly the same rate of speed as can the linear scale, and with much greater accuracy. It can be used to measure leaves in the field, and anyone can be taught to use it in a short time.

The collected leaves from measured R. lacaustre bushes, are being measured at the present time, but are as yet incomplete.

Leaves from many bushes of R. viscosissimum, R. petiolare, and G. inermis are also awaiting measurement, but there are no results to report.

IV. Summary

There are no final data yet available from this study.

In developing this scale, 1000 leaves of R. lacustre from bushes of every size and form were each twice measured by planimeter. At the same time, the area of the circle which would entirely enclose the individual leaf was recorded. The average planimeter measurement of the 1000 leaves proved to be .516 of the average area of the circumscribed circle. Hence the R. lacustre scale has for its set of areal figures, areas which give in square inches, .516 of the area of each individual circle.

The R. viscosissimum scale was developed in a similar way, the areal figures on this scale being .597 of the circle area.

Scales for the other Ribes species have not yet been made, but will be made on the same basis.

III. Results of Study

The average factor is .516 for the 1000 measured R. lacustre leaves. Of these 1000 leaves, only 14 have a factor of over .700, and only 14 have a factor of under .520.

Of the 1000 leaves, 26 leaves were very much distorted in shape. These 26 misshapen leaves have an average factor of , .551. If these misshapen leaves had not been used, the average factor would have been .51765.

A check of the circle scale and of the linear sca e was made on 51 leaves, with each leaf twice planimetered. The result [illegible] this test are shown in Table 3.

For the 1000 measured R. viscosissimum leaves, the average factor is .597. Of the 1000 leaves, only 14 leaves have a factor of over .756, and only 28 leaves have a factor of less than .536. The 1000 R. viscosissimum leaves included such misshapen leaves as were encountered in a field-run collection.

No check of the circle scale against the linear scale has been made for R. viscosissimum.

This scale can be used with nearly the same rate of speed as can the linear scale, and with much greater accuracy. It can be used to measure leaves in the field, and anyone can be taught to use it in a short time.

The collected leaves from measured R. lacustre bushes, are being measured at the present time, but are as yet incomplete.

Leaves from many bushes of R. viscosissimum, R. petiolare, and R. inerme are also awaiting measurement, but there are no results to report.

IV. Summary

There are no final data yet available from this study.

Ribes lacustre Studies

I. Purpose of Study

The purpose of the study is to obtain intimate knowledge of the life and growth habits of R. lacustre.

II. Methods of Work Used

A square chain plot was established in 1924 on a 1920 burn having a heavy crop of R. lacustre seedlings since the fire. The plot is subdivided into 64 half-rod squares. The following data regarding each Ribes were taken, and a count of the coniferous growth by species in each square, was made.

III. Results of Study

Of the 79 R. lacustre within the plot in 1926, the years of germination are divided as follows:

1920 - 1
1921 - 24
1922 - 27
1923 - 9
1924 - 9
1925 - 3
1926 - 2
Doubtful age - 4

The data for the preceding years are not yet assembled, so no further report can be made.

IV. Summary

Germination was heaviest the two years following the fire, and has decreased steadily since that time.

Ribes viscosissimum Studies

I. Purpose of the Study

The purpose of this study is to obtain an intimate acquaintance with the life and growth habits of R. viscosissimum.

Table III.

Check on R. lacustre Circle Scale

Area in Square Inches					% Error from Average Planimeter Measurement.	
Circle Scale	Linear Scale	1st Planimeter Measure	2nd Planimeter Measure	Average Planimeter Measure	Circle Scale	Linear Scale
5.25	3.45	5.28	5.33	5.31	-1.11	-35.03
4.30	2.95	4.47	4.51	4.49	-4.23	-34.30
5.45	3.75	5.32	5.35	5.34	+2.06	-29.77
4.30	3.00	4.75	4.74	4.75	-9.47	-36.84
3.55	2.55	3.60	3.64	3.62	-1.93	-29.56
2.75	2.00	2.71	2.76	2.74	+0.37	-27.01
6.10	3.40	6.10	6.00	6.05	+0.83	-43.80
4.25	2.80	4.40	4.40	4.40	-3.41	-36.36
4.35	2.90	4.52	4.54	4.53	-3.97	-35.98
6.30	4.15	6.32	6.41	6.37	-1.10	-34.85
4.95	2.80	4.85	4.90	4.88	+1.43	-42.62
4.65	3.10	4.82	4.76	4.79	-2.92	-35.28
3.20	2.25	3.20	3.29	3.25	-1.54	-30.77
5.45	3.70	5.27	5.35	5.31	+2.57	-30.32
5.05	3.35	5.10	5.16	5.13	-1.58	-34.70
4.65	3.15	4.72	4.74	4.73	-1.72	-33.51
4.25	3.25	4.30	4.32	4.31	-1.41	-24.59
4.35	3.00	4.05	4.05	4.05	+6.90	-25.93
3.90	2.80	3.60	3.60	3.60	+7.69	-22.22
3.80	2.90	3.53	3.51	3.52	+7.37	-17.61
2.80	2.40	2.86	2.84	2.85	-1.78	-14.29
1.90	1.65	1.87	1.90	1.89	+0.53	-13.16
6.10	3.85	5.70	5.70	5.70	+7.01	-32.46
5.10	3.15	5.00	5.00	5.00	+ 2.00	-37.00
4.70	3.20	4.53	4.60	4.57	+2.85	-29.98
4.95	3.55	4.92	5.00	4.96	-0.02	-28.45
3.70	2.65	3.65	3.67	3.66	+1.09	-27.30
2.20	1.75	2.20	2.22	2.21	-0.05	-20.81
2.15	1.90	2.02	2.00	2.01	+6.96	- 5.47
1.15	1.00	1.16	1.17	1.17	-1.71	-14.53
0.40	0.45	0.40	0.40	0.40	0.00	+11.25
Totals and Averages						
126.30	86.80	125.22	125.88	125.55	+0.59	-30.87

II. Methods of Work Used

A series of square chain plots have been established at Elk River, Idaho and Sanders, Idaho where the rate and manner of growth of R. viscosissimum is under observation.

For each square chain plot, the following maps are made; (1) Contour map (2) Vegetative type map (3) Ribes location map (4) White Pine location map. In addition, the following data were taken regarding each individual Ribes.

Table No. IV

Ribes viscosissimum Growth Studies

Serial No. of Ribes	Height of Ribes in feet	Live Stem of Ribes in feet	Dead Stem of Ribes in feet	New Growth of Ribes in feet	Percent and kind of Shade	Hours of day in Sunlight	Percent of Diffuse light	Special Notes
1	1.0	1.0		0.1	100.0 Log	8:30-2:00	100.0	Under north edge of 30 inch down log.
2	2.2	4.2		0.7	95.0 Ceanothus	12:00-6:00	85.0	
3	2.4	4.0	7.2	1.0	50.0 Ceanothus	8:00-11:30 2:00-6:30	100.0	

II. Methods of Work [illegible]

A series of square chain plots have been established at Elk River, Idaho and Sanders, Idaho where the rate and manner of [illegible] of R. viscosissimum is under observation.

For each square chain plot, the following maps are made: (1) Contour map (2) Vegetative type map (3) Ribes location map (4) White Pine location map. In addition, the following data were taken regarding each individual Ribes.

Table No. IV

Ribes viscosissimum Growth Studies

Serial No. of [illegible]	Height of Ribes in [illegible]	Live Stem of Ribes in feet	Dead Stem of Ribes in feet	New Growth of Ribes in feet	Percent and kind of [illegible]	[illegible] of [illegible] in [illegible]	Percent of Diffuse [illegible]	Special Notes
1	1.0	1.0		0.1	100.0 Log	8:30-2:00	100.0	Under north edge of [illegible] inch down log.
2	2.2	4.2		0.7	95.0 Ceanothus	2:00-6:00	85.0	
3	2.4	4.0	7.2	1.0	50.0 Ceanothus	8:00-11:30 2:00-6:30	100.0	

III. Results of the Study

Some of the plots which are being studied were first established in 1922 and were rechecked in 1923 and again in 1926. Some very good growth studies are already obtainable from the data already gathered, but the tabulations are incomplete, so no report can yet be made.

Five such plots have been established, 4 at Elk River, Idaho, and 1 near Sanders, Idaho.

IV. Summary

Tabulation and analysis of these plots are incomplete, and no report can yet be made.

Grossularia inermis Studies

I. Purpose of Study

The purpose of the study is to obtain intimate knowledge of the life and growth habits and conditions of *G. inermis*.

II. Methods of Work Used

A square chain plot was established near Santa, Idaho, and permanently plotted and staked.

A contour map and a Ribes location map of the plot were very carefully made. The data taken for each Ribes bush, is shown in Table No. IV.

III. Results of Study

The tabulation and analysis of conditions on the plot are not yet available, since the field data has not been assembled.

IV. Summary

Since the data are not yet tabulated and analyzed, no summary can be made.

Age Studies of Ribes

No definite study of Ribes ages has yet been carried on. Only numerous observational notes at widely separated times and localities have been taken.

The youngest fruiting Ribes bush yet recorded by the Western Office is one which germinated in 1924 on an early 1924 burn (Meadow Creek Burn No. 1.) This bush in August 1926 had 38 feet of live stem, and there were 3 ripe fruits on the plant. This observation proves that fruiting can begin two years after germination.

Numerous bushes have been counted for age. The usual minimum fruiting age appears to be from 5 to 7 years.

From counts of ages of several hundred bushes in the past four seasons, very few Ribes in the white pine region of the Inland Empire show more than 15 years of actual live stem. These same older bushes, however, usually have a large amount of dead stem, indicating that the actual age is probably many years more than is actually counted either by the annual rings or by the annual linear growth.

The usual one-year old Ribes seedling is a very small plant, probably averaging less than 2 inches in height, yet individual plants do make some very rapid growths. For instance, on Lakeview Burn No. 1, one R. viscosissimum seedling of 1926 germination was found on September 14th, 1926, having a height of 2.2 feet, with 3.2 feet of live stem.

One area having a large number of R. viscosissimum bushes, which are fruiting heavily is between Oviat Burn No. 1 and Oviat Burn No. 2 along a series of railroad cuts and fills. Age count, by linear stem growth only, was made of 55 of these bushes. Germination in 1919 was indicated by 12 of these, 1920 by 20, and 1921 germination by 23. Many were so indeterminate as to age that it is quite possible all of these bushes are of 1919 germination.

A logger of this vicinity stated that these railroad cuts and grades were made in June 1918, which would indicate germination in 1919.

CONTROL RECONNAISSANCE ON FEDERAL LANDS, IDAHO.

by
H. N. Putnam,
Assistant Pathologist.

* *

I. Purpose.

The purpose of control reconnaissance as performed this past season was to make a rapid and systematic survey of the white pine regions to determine: (1) the extent and distribution of white pine types, and (2) the factors influencing the cost and methods of eradicating Ribes thereon.

Information desired on areas worked may be grouped into 5 major subdivisions as follows:

1. Timber types.
2. Timber age classes.
3. Eradication types.
4. Ribes per acre by species within each eradication type.
5. Physical factors.

It was also a secondary purpose of control reconnaissance to furnish projects such as experimental Ribes eradication, ecology and chemical eradication the information as to the location of areas peculiarly adapted to the needs of such projects.

II. Methods of Work.

Control reconnaissance as performed this past field season was so radically different from that of preceeding years that a word of explanation is necessary.

In 1923 and 1924 reconnaissance was performed on a drainage basis using the strip method. The section as a unit was not considered. Two or three men made up a crew.

In 1925 reconnaissance data were taken on the basis of 4 strips through a section. Two men made up a crew.

In 1926, in order to overcome several weaknesses, the methods of performing the work were radically changed. The bad features of reconnaissance performed previously to 1926 were as follows:

1. Insufficient acreage covered. There are approximately 3,721,125 acres gross in the 5 Idaho National Forests lying in the region of white pine production, approximately 1,550,000 acres of which are white pine type. Previous to the 1926 field season we had reconnaissanced 199,811 acres, not necessarily all white pine type. This constituted less than 6% of the gross acreage.

2. Too large a cost per acre. Reconnaissance performed previous to 1926 had cost from 11 cents to 13 cents per acre for intensive work.

3. It was a long difficult matter to put data collected into usable form.

Reconnaissance in 1926 was organized with the purpose of correcting these defects. By means of extensive typing, and the use of one man crews on intensive work a much larger area was covered with a consequent reduction in cost per acre. Data were taken in the field by means of 1/10 acre plots and put into final summary form on sectional basis in the field. This did away with the necessity for long, tedious office calculations in the winter. It was also more accurate, since special conditions could be set down while they were still fresh in the field man's mind.

It is well at this time to call attention to the relationship between intensive reconnaissance and extensive reconnaissance, or typing. It is the function of the latter phase of work to furnish the application to which the intensive data on sections judiciously chosen would apply. As the data taken on plots in each type were taken as defining conditions on the section, so were the sections chosen considered as typical of the extension of such types studied.

Instructions to Field Men.

The methods of performing control reconnaissance used by men working on Federal lands and timber protective associations can best be explained by "Instructions for Performing Control Reconnaissance", a copy of which was given to each man at the beginning of the training period. The paper follows quoted in full:

"I. Purpose:

The purpose of control reconnaissance is to make a rapid and systematic survey of the white pine region to determine: (1) the extent and distribution of white pine types, and (2) the factors influencing the cost and methods of eradicating Ribes thereon.

"II. Methods:

In brief, the method of performing control reconnaissance is as follows: each man works a section alone, under the supervision of the Chief

of Party. He maps in type limits and then studies each type from the standpoint of blister rust control by means of representative sample plots.

"The actual details of work may be considered in 3 steps: (1) the division of a section into eradication types, timber types and timber age classes; (2) obtaining by means of sample plots detailed information on each type; and (3) compilation of data on sectional basis in final form.

"A. Typing: the section and such areas adjacent thereto as can be readily seen will be covered in such manner that all types will be seen, sketched in, and properly designated as to eradication type, timber type and timber age class. This may be done by any one of the following methods or similar methods, as is best adapted to local topography.

"The mapper may cover the section by starting at a quarter corner, running a line to each of the other three quarter corners and closing on his starting point.

"He may run through the center of two quarters, offset a half mile on the section line, and return through the center of the two remaining quarters.

"He may start at a section corner, run diagonally across a corner forty, then traverse the section on forty lines.

"He may start at a known point on the section and run a random line on the section, plotting his course as he goes.

"The essentials for the mapper to bear in mind are: (1) always to keep himself oriented, and (2) to be sure that all types have been covered. Whatever method he uses, the mapper should tie in to some land office corner. Distances will be measured by pacing and directions taken by box compass.

"Designation of types: the standard classification of forest types as used by the Forest Service will be used. A copy of definitions of these types accompanies these instructions.

"The age class of a timber stand will be that age class which will next be logged. The following timber age classes will be recognized:

1 - 10 years
11 - 20 years
21 - 40 years
41 - 60 years
61 - 80 years
81 - 100 years
101 - 200 years
200 + years

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11 - 20 years
21 - 40 years
41 - 60 years
61 - 80 years
81 - 100 years
101 - 200 years
200 + years

"An eradication type is an area on which eradication working conditions are similar. There will be eight eradication types defined as follows:

"1. Dense mature (D.M.) a stand of timber 12" D.B.H. or over, which is fully stocked or nearly so, and generally, but not necessarily, contains little brush and few Ribes.

"2. Open mature (O.M.) a stand of timber 12" D.B.H., or over, which is understocked, this condition generally resulting in the presence of brush and Ribes.

"3. Dense pole (D.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is fully stocked or nearly so, and generally but not necessarily, contains little brush and few Ribes.

"4. Open pole (O.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is understocked, this condition generally resulting in the presence of brush and Ribes.

"5. Dense reproduction (D.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are uniformly and thickly distributed over the ground. Brush and Ribes may or may not be present, depending on the size of the reproduction.

"6. Open reproduction, (O.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are unevenly distributed in patches, over the ground, the intervening openings generally containing brush and Ribes.

"7. Stream type (St.) an area varying in width along a stream which, due to the opening in the timber stand and presence of moisture, presents a favorable situation for the growth of Ribes and associated brush.

"8. Brush (Br.) an area either cut or burned over on which reproduction has not yet occurred.

"B. Recording data: information on each type will be obtained by means of one man sample plots distributed over the type in such manner as will give representative conditions. To avoid the influence of personal selection, such plots will be located at arbitrary distances over some course that will cover the type. At least 1/2 of 1 percent of each type other than stream type should be covered by circular sample plots. On stream types at least 2 percent of the area should be covered, since the stream type is the most important, because of the large number of Ribes and conditions favorable to the development of the blister rust.

"On types other than stream type, data will be taken on circular plots having an area of 1/10 acres and a radius of 37 feet. On stream types data will be taken on plots 4 chains long and 1 rod wide, having an area of 1/10 acres.

"The location of each sample plot should be indicated on the map corresponding to its number.

"A detailed explanation of the forms for recording data is omitted here, because the forms are self explanatory.

"C. Compilation of data: upon arrival in camp in the evening all type lines must be jibed with maps previously typed.

"On rainy days and at odd times data must be completely worked up on the section summary sheet, so that at the end of each month the entire work done to date is in final form and in the Field Supervisor's hands. It is part of the Chief of Party's responsibility to see that this is done."

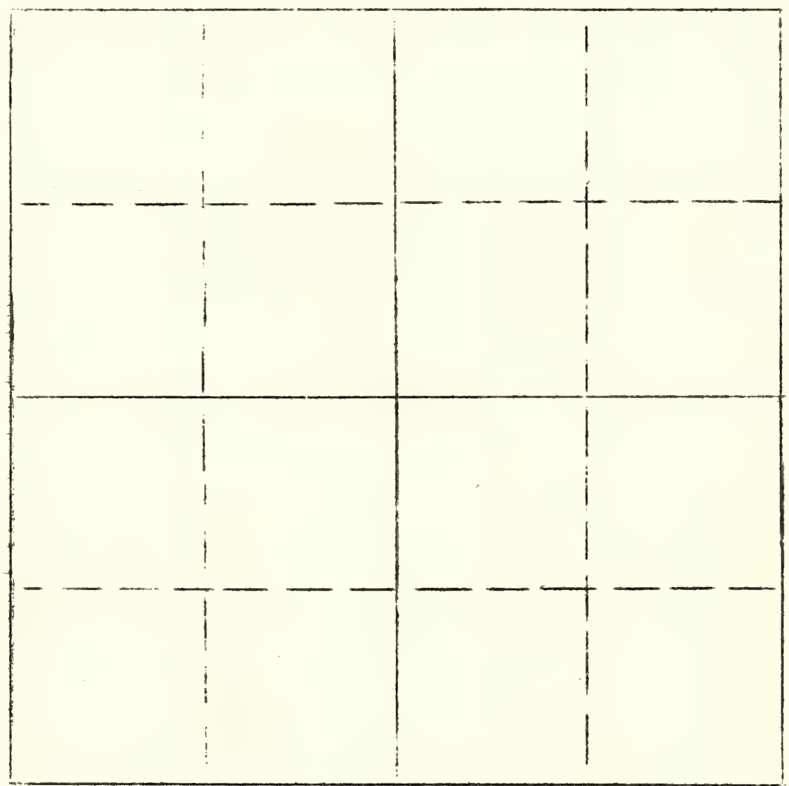
The following forms were used in the field, in recording reconnaissance data:

WF-25-BRC-6-12-26

Sec._____ T._____ R._____ Locality____________________

Mapped by____________________ Date__________ 1926

Notes by ____________________ Date__________ 1926



Scale 4 in. = 1 mile
(Legend on reverse side)

LEGEND

Eradication Types:
- Dense Mature - - - - - D.M.
- Open Mature - - - - - O.M.
- Dense Pole - - - - - D.P.
- Open Pole - - - - - - O.P.
- Dense Reproduction - D.R.
- Open Reproduction - -O.R.
- Stream - - - - - - - - St.
- Brush - - - - - - - -Br.

Timber Types:
- White Pine - - - W.P.
- Yellow Pine - - -Y.P.
- Lodgepole Pine - L.P.
- Douglas Fir - - -D.F.
- White Fir - - - -W.F.
- Alpine Fir - - - A.F.
- Cedar - - - - - -C.
- Hemlock - - - -- H.
- Larch - - - - - -L.
- Spruce - - - - - S.

Age Classes:
- 1-10
- 11-20
- 21-40
- 41-60
- 61-80
- 81-100
- 101-200
- 200+

Rock:
- Talus - - T.
- Boulders -B.
- Outcrop - O.

Windfall:
- Light - - - L.
- Medium - - -M.
- Heavy - - - H.

Plot Sizes:
- 1/10 acre = circle of 37 foot radius
- 1/20 acre = rectangle 2 chains by 1 rod

Type line ....

WF-24-BRC-6-12-26

Sec. T. R. Locality

Erad. Type Timber Type Age Class Acres

Plot		0-1		1-6		6-12		Over 12		Composition	
No.	Size	W.P.	Other	W.P.	Other	W.P.	Other	W.P.	Other	Over story	Under story
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Plot		Ribes Species									Brush	Wind	Rock
No.	Size										Density	fall	T.B.
		1	2	3+	1	2	3+	1	2	3+	Tenths	H.M.L.	O.
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

Remarks:- Exposure, brush genera, date of cutting or burn, condition of timber and Ribes, etc.

S E C T I O N   S U M M A R Y

S. T. R. Locality Mapped by Date Notes by Date

Erad. Type	Timber		Plot Acres	Type Acres	Trees per Acre								Stand Composition		Genera	Dens %
	Type	Age Class			0-1		1-6		6-12		Over 12		Overstory	Understory		
					W.P.	Other	W.P.	Other	W.P.	Other	W.P.	Other				

Remarks:-

SECTION SUMMARY

S.   T.   R.   Locality

Windfall	Rock		Ribes per Acre												Total Ribes			
	Class	Abundance	1	1-3	3+	Total	1	1-3	3+	Total	1	1-3	3+	Total	1	1-3	3+	Total

Modification of Methods

Certain modifications of the methods adopted at the beginning of the season as applied to work on Federal lands can best be explained by a memorandum issued on July 4, 1926. This is given below, quoted in full.

"Considered in 4 portions:

I. Extensive typing.
II. Picking representative sections.
III. Working selected sections by sample plot method.
IV. Working up results.

I. Extensive Typing:

"On a two inch to mile township map are drawn all streams, roads, trails and peaks. This is taken from the G. S. map. The man typing has with him a G. S. map with all available typing thereon, and one or more township plats.

"He traverses the ridges, mapping in timber types, age classes, and eradication types at every opportunity. By going around a drainage he can get this information with a fair degree of accuracy. If it is not possible for him to determine at a distance the age class, timber type, or eradication type, he puts in his best estimate. He checks his location by pacing from a known point, and by local topography. This kind of work calls for considerable good judgment, and an accurate sense of proportion. There is a tendency to make too many types. Often a type which appears from one angle to be dense mature, proves from a different view point to be a younger age class with a scattered overstory. This is particularly true in the Prichard area, where there are thousands of acres of 1889 burn coming up densely to excellent white pine- white fir - hemlock reproduction 35 years old. Over certain portions of this area are scattered larch, white pine mature. This often gives the effect of a mature stand when seen from certain angles.

II. Picking Representative Sections:

"When a large drainage, 15 or 20 sections, has been typed extensively it is the duty of the chief of party to study this map and pick out certain sections for plot work. The essentials for him to bear in mind are that the sections chosen shall be white pine, and that all different age classes and eradication types in the white pine type in that drainage will be covered by sample plots.

III. Working Selected Sections by the Sample Plot Method:

"Before going into the field the man designated to work a given section or sections draws in all type lines on his 4 inch to mile map

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from the extensive type map. He then figures the acreage in each white pine type and finds out how many plots it will be necessary to take in order to make up .5% of types other than stream type, and 2% of stream type. He then plots these sample plots on his map sheet, usually at a stated distance apart and in a straight line, being careful that all sample plots come well inside the type studied.

"Two deviations from the standard method of putting in plots I believe will prove better.

"Timber is taken on a circular 1/10 acre plot as before. Reproduction is counted on a circular 1/40 acre plot having a radius of 18 feet. This is multiplied by 4 and set down as the number on a circular 1/10 acre plot.

"Considerable difficulty and diversity of opinion developed in taking a Ribes count on a circular 1/10 acre. Owing to the size of the plot, 37 feet radius, it was nearly impossible to get an accurate count of Ribes, particularly in dense reproduction. Either many Ribes were missed, or else some counted twice. To overcome this difficulty, and to be free to concentrate on Ribes, the latter are now being counted on a plot 4 chains long and 1 rod wide, similarly to stream type.

"The essential thing we are after is the Ribes per acre; and heretofore the man's attention has always been divided between timber and Ribes. By the method of taking timber data on a circular 1/10 acre at the beginning of a 4-chain 1/10 acre plot, and then concentrating on Ribes, it is believed that a much more accurate figure will be obtained on the number of Ribes per acre. There will be no appreciable loss in timber data accuracy. To be sure, the timber data is not taken on the whole of the Ribes strip, but is it, after all important? Since we are studying conditions by types, I believe we have not lost anything. Furthermore since it is not necessary to take timber data on areas on which there are already timber data available, let us be consistent and not necessarily confine our taking timber data strictly to Ribes strips. I believe that whatever we lose in strict timber accuracy will be more than compensated by increased Ribes count efficiency. After all, our timber data are only "conscientious approximations".

"The man doing sample plot work also is free to check up on type limits as given him from the extensive type map.

IV. Working up Results:

"Each night the sample plot man works up his data on the final section basis, and makes his additional notes while everything is fresh in his mind.

Additional Notes

"After a thorough tryout of this method in the field, I have come to the conclusion that control reconnaissance, as performed this year will be the best we have performed yet from the standpoints of (1) covering many acres well, and (2) training men.

"1. Covering the ground. This method should enable us to get the dope on at least 250 or 300 sections at a low cost per acre.

"2. Training men. Data on types are taken by means of 1/10 acre plots. Each night, or when the section is finished, data are worked up on acreage basis, while conditions are fresh in mind. At the end of the season, a good reconnaissance man should be able to go over a piece of ground and estimate quite accurately the number of trees and Ribes per acre on that area, at least in number classes: below 10, 10-50, 50-100, 100-200, etc. In other words, this training is excellent for future advance scouts. It develops a man's "acreage perception", so to speak.

"Also in typing extensively a man develops himself very much to the advantage of the office.

"At the end of the season on all areas worked, I plan to have township maps 2" to mile on which are shown the following items: timber type, age class, eradication type, Ribes per acre. The notes will show where such Ribes occur by species and number."

III. Results of Control Reconnaissance

The work performed on Federal lands can well be discussed under five headings as follows:

A. Training of personnel.
B. Coeur d'Alene National Forest.
C. Palouse Division, St. Joe National Forest.
D. Coeur d'Alene National Forest and St. Joe National Forest combined.
E. Preliminary trip on St. Joe National Forest.

A. Training of Personnel:

The temporary men employed for this work were given a 4½ day training in reconnaissance methods on a portion of the area to be worked near Prichard, Idaho, from June 22 to June 26. During this period, one day was spent in camp going over the written instructions. Three days were spent by the entire crew in methods of typing and plot work, during the course of which instruction was given in the identification of Ribes and other shrubs. One-half day was devoted to training in methods of

Additional Notes

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"At the end of the season on all areas worked, I plan to have township maps 2" to mile on which are shown the following items: timber type, age class, eradication type, Ribes per acre. The notes will show where such Ribes occur by species and number."

III. Results of Control Reconnaissance

The work performed on Federal lands can well be discussed under five headings as follows:

A. Training of personnel.
B. Coeur d'Alene National Forest.
C. Palouse Division, St. Joe National Forest.
D. Coeur d'Alene National Forest and St. Joe National Forest combined.
E. Preliminary trip on St. Joe National Forest.

A. Training of Personnel:

The temporary men employed for this work were given a 4½ day training in reconnaissance methods on a portion of the area to be worked near Prichard, Idaho, from June 22 to June 26. During this period, one day was spent in camp going over the written instructions. Three days were spent by the entire crew in methods of typing and plot work, during the course of which instruction was given in the identification of Ribes and other shrubs. One-half day was devoted to training in methods of

summarizing data on the final sectional basis.

During the course of the summer, every man who stayed on through the season visited the eradication camps for the purpose of:

(1) Getting the eradication man's view point on the interpretation of eradication types, and
(2) Familiarizing himself with the eradication methods.

Costs of Training: Table No. 1 shows the items making up the costs of training the personnel.

Table No. 1

Training Costs

Salaries	Travel			Subsistence			Equipment		Grand Total
	Auto	Other	Meals	Meals	Rate per Meal	Cost	Charge	Frt.	
223.90	27.93	11.00	12.85	98	.283	27.71			
				52	0	0			
				Meals paid for as received		3.00			
Totals 223.90	27.93	11.00	12.85			30.71			306.39

A total of 58 1/2 days were spent in training, divided as follows:

Training reconnaissance	32 1/2
Training eradication	13 1/2
Travel incident to training	12 1/2

$$\frac{\text{Total Cost}}{\text{No. of Men}} \quad \frac{\$306.39}{7} = \$43.77 \text{ Training cost per man}$$

$$\frac{\text{Total Training Cost}}{\text{Man Days}} \quad \frac{\$306.39}{58.5} = \$\ 5.24 \text{ Cost of training per man day}$$

B. Coeur d'Alene National Forest

(1) Geographical Description

Control reconnaissance in 1926 was performed in the eastern portion of the Coeur d'Alene Forest, on the area comprising nearly all of the Prichard and Carter Ranger districts. It included the entire drainages and tributaries of Big Creek, Lost Creek, Prichard Creek, Beaver Creek, Cedar Creek, Grizzly Creek, Graham Creek, Steamboat Creek and that portion of the North Fork of Coeur d'Alene River and its tributaries not previously mentioned, from the mouth of Big Creek to the mouth of Steamboat Creek.

Topography is rugged, consisting of comparatively low, steep-sided hills. Elevations range from 2250 feet above sea level at the mouth of Steamboat Creek to 6810 feet at the top of Granite Peak, and points above 6000 feet on the Idaho-Montana state line. The streams are swift flowing, with narrow, steep sided valleys, for the most part. The lower portions of Eagle Creek, Prichard Creek and Beaver Creek have the widest valleys varying in width from one-eighth to one-quarter miles, but never exceeding one-half mile.

(2) Economic Development

The chief industries in the region are mining, lumbering, and general farming. This was once a region of great mining activity. Mines are still in operation on Beaver Creek, East and West Forks of Eagle Creek and at several points on Prichard Creek. Prichard Creek has been extensively dredged for gold, the operation being completed in June 1926.

Lumbering operations are principally carried on by two concerns, the Winton Lumber Company operating on Falls and Big Creeks, and the Mountain Lumber Company operating on the East Fork of Eagle Creek. The Winton Lumber Company, cutting Forest Service and privately owned lumber on Falls Creek, send their logs by means of greased chutes and water flumes to Big Creek, thence drive them by a series of splash dams, to a log pond near the mouth of Big Creek, where they are loaded on freight cars and shipped out. The Mountain Lumber Company, cutting on Forest Service timber entirely, take their logs by rail to their small mill on Eagle Creek, six miles from their cutting operation.

In the past there have been extensive cutting operations on Big Creek, Cedar Creek, Graham Creek and Steamboat Creek.

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In the past there have been extensive cutting operations on Big Creek, Cedar Creek, Graham Creek and Steamboat Creek.

General farming is limited to a few small ranchers on the North Fork of the Coeur d' Alene River, and on Beaver Creek.

There are two towns in this region, Prichard and Murray. They were once thriving mining centers of several thousand population each, but now are reduced to one or two hundred inhabitants each. Both Prichard and Murray have good general stores from which food supplies may be obtained.

There are two District Ranger headquarters, Carter and Prichard. Through the cooperation of the Forest Service, facilities are available for storing supplies and for camping at each of these offices. Temporary summer Forest Service field stations are located for fire protection purposes at Grizzly Peak, Little Baldy Lookout, at the junction of Falls and Big Creeks and at Clinton Creek.

(3) Accessibility

This area is well opened up by railroads, roads and trails. There is one train every week day coming into Prichard from Spokane. The Winton Lumber Company has a logging railroad from Prichard up the North Fork of Coeur d'Alene River, ten miles to Big Creek, on which there is a daily, except Sunday, logging train connecting with the main line at Prichard. There is also a logging railroad extending north from Prichard twelve miles up East Eagle Creek built by the Mountain Lumber Company.

There are seventy-five or eighty miles of good passable auto roads in the region, confined to the Beaver Creek, Prichard Creek and Eagle Creek drainages, and to the North Fork of the Coeur d' Alene River from Prichard down the river. The region is accessible from points outside by means of a good auto road north from Wallace, Idaho to Prichard along Beaver Creek and a passable road east from Enaville, Idaho up the North Fork of the Coeur d'Alene River to Prichard. A resurvey of this roadway was made in the summer of 1926.

The country not covered by roads is well opened up by Forest Service trails and old logging ways, thus making any portion of the area accessible.

Owing to the distribution of ranches, logging camps, Forest Service stations and mining camps facilities for boarding are excellent. Camping sites are numerous at abandoned logging camps and mining camps throughout the area.

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(4) Forest Types Found

Excellent white pine stands occur throughout the region. The white pine types do not form continuous stands, but are generally confined to the north and east facing slopes and cool, narrow draws. The north and south exposures seem to exert much more of an influence on type composition than do the east and west exposures. That is, a slope essentially facing west, but also slightly north supports a white pine type, whereas a slope facing east and south is covered by a non white pine type. On nearly half of the entire area reconnaissanced white pine type occurs. The white pine is found in mixture with larch, lodgepole pine, white fir, alpine fir, Douglas fir and cedar as well as western hemlock. The last named species is not as common here as it is in the western part of the forest and further north. White pine extends up to 5000 feet elevation in commercial stands.

In this region there are extensive stands of larch, Douglas fir and white fir, occupying south and west exposures. On the hottest, dryest slopes scattered Douglas fir is found growing among rocks and in shallow soil.

Considerable sub-alpine type occurs. This consists often of nearly pure stands of mountain hemlock (<u>Tsuga mertensiana</u>) or stands consisting of black hemlock and alpine fir. This type occurs in a band from 5000 to 6000 feet above sea level. Above 6000 feet white bark pine (<u>Pinus albicaulis</u>) is found. On the top of Granite Peak (elevation 6810 feet) a pure stand of white bark pine occurs.

(5) Age Classes Represented

All of the age classes of white pine type occur in this region. There is a large acreage of age classes up to 41 to 60. In 1889 when mining activities first began, the miners burned over large areas in Beaver and Prichard Creeks to expose the surface of the soil. On the north facing slopes of such areas there are now excellent stands of fully stocked white pine, about 35 years old. Large areas burned over in 1910 in the Lost Creek drainage are now coming back well to white pine about 15 years old. Several cut over areas have good white pine reproduction one to ten years of age.

There are quite extensive areas of 81 to 100 and 101 to 200 year white pine on Steamboat and Big Creeks. The 200 plus year white pine occurs on Big Creek and on the upper portions of Prichard Creek.

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(6) Ribes Conditions

Ribes are abundant and well distributed in this region. Only a relatively small per cent of the area reconnaissanced was found to be Ribes free.

Five species of Ribes found listed in order of decreasing abundance. R. lacustre, R. viscosissimum, Grossularia inermis, G. irrigua, and R. coloradense.

R. lacustre has the widest distribution of any Ribes found. It occurs in every eradication type, being especially profuse along streams and in brush types.

R. viscosissimum owing to its intolerance of shade and its relatively low water requirements is most abundant in brush and open types. It occurs much less frequently along streams and in dense stands of timber.

G. inermis is quite strictly an inhabitant of the meadow formation. It is almost entirely limited to deep, moist soils, growing intermingled with maple, alder and willow. It is found in abundance on Beaver Creek, Eagle Creek and Prichard Creek.

G. irrigua in this region reaches its greatest abundance at the edges of talus slopes, where often it forms the chief brush, growing in sprawled masses. Large amounts of this species were found on talus slopes of Eagle Creek, Big Creek, Cedar Creek and the North Fork of the Coeur d'Alene River. Owing to the fact that the field men experienced difficulty in distinguishing G. inermis from G. irrigua, these two species were considered together.

R. coloradense was found only at one location, near the outlet of Revett Lake, at an elevation of 6300 feet. Here it occurred in dense, low masses among the rocks at the edge of the fast flowing stream. Since evidently it is a species confined to subalpine types, it is not a factor in the protection of commercial white pine from blister rust.

R. coloradense has not previously been known to occur in the Idaho white pine region. The Ribes species found at Revett Lake is tentatively named R. coloradense because its characteristics other than flower and fruit fit the description of R. coloradense. Definite determination of the species will be made in the spring when it is in flower.

(7) Results Obtained.

Table No. 2 shows the land description and number of acres on which control reconnaissance, both intensive and extensive were performed in 1926

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Table No. 2.

Location and Number of Acres Reconnaissanced,

Prichard and Carter Ranger Districts, Coeur d'Alene National Forest, 1926.

Sections Worked in Whole or in Part									
		Intensive Reconnaissance			Extensive Reconnaissance			Grand Total	
			Total			Total			
Twp	Range	Sections by Number	Sec.	Acres	Sections by Number	Sec.	Acres	Sec.	Acres
48N	4 E				1,2,3,	3	1920	3	1920
49N	3 E	1,2,9,11	4	2560	3,4,5,8,10,12,13, 14,15,16,17,24,	12	7680	16	10240
49N	4 E	1,2,5,6,9,10,11,16 18,19,22,23,25,27, 29,34,35,36	18	11520	3,4,7,8,12,13,14, 15,17,20,21,24,26, 28,30,33	16	10240	34	21760
49N	5 E	6,7,8,9,13,14,15, 16,17,19,22,24,27, 28.	14	8960	1,2,3,4,5,10,11,12 18,20,21,23,25,26, 29,30,31,32,33,34, 35,36	22	14080	36	23040
49N	6 E	18,19,20	3	1700	4,5,6,7,8,9,16,17, 29,30,31	11	5122	14	6822
50N	2 E				1,2,3,4,5,6,9,10, 11,12,13,14,15,16, 21,22,23,24	18	11520	18	11520
50N	3 E	2,11,25,26,35,36	6	3840	1,3,4,5,6,7,8,9,10 12,13,14,15,16,17, 18,19,20,21,22,23, 24,27,28,29,30,31, 32,33,34	30	19200	36	23040
50N	4 E	3,4,8,17,20,21,22, 23,24,25,26,27,28, 29,30,31,34,35,36	19	12160	1,2,5,6,7,9,10,11, 12,13,14,15,16,18, 19,32,33	17	10880	36	23040
50N	5 E	2,3,4,5,7,12,13,14 16,31,32	11	7040	1,6,8,9,10,11,15, 17,18,19,20,21,22, 23,24,25,26,27,28, 29,30,33,34,35,36.	25	16000	36	23040
50N	6 E	19	1	620	6,7,8,17,18,20,30, 31,32,33	10	3335	11	3955
51N	1 E	24	1	640	25,26,35,36	4	2560	5	3200
51N	2 E	16,19,22,30,31,34	6	3840	9,10,11,13,14,15, 17,18,20,21,23,24, 25,26,27,28,29,32, 33,35,36	21	11555	27	15395
51N	4 E	3,4,10,15,17,21,32	7	4480	1,2,5,6,7,8,9,11, 12,13,14,16,18,19, 20,22,23,24,25,26, 27,28,29,30,31,33, 34,35,36.	29	18560	36	23040
51N	5 E	6,8,33,34	4	2310	5,7,17,18,19,20, 21,22,23,26,27,28, 29,30,31,32,35	17	8934	21	11244
52N	3 E				Entire Township	36	23040	36	23040
52N	4 E	17,22,29,33,34	5	3200	3,4,5,6,7,8,9,10, 14,15,16,18,19,20, 21,23,24,25,26,27, 28,30,31,32,35,36	26	15240	31	18440
52N	5 E	19,30,31,32	4	1780	29	1	160	5	1940
53N	3 E				25,26,32,33,34,35, 36	7	4480	7	4480
53N	4 E				19,29,30,31,32,33	6	2590	6	2590
T O T A L S			103	64650		311	187096	414	251746

Table No. 3 gives the division of the total acreage reconnaissanced into white pine type and non white pine type, and the further division into age classes and eradication types.

Table No. 3 [illegible] the [illegible] of the total acreage reconnaissanced into [illegible] type and non white [illegible] type, and the [illegible] into age classes and [illegible] types.

Table No. 3

Total Acres Reconnaissanced by Age Classes and Eradication Types, Coeur d'Alene Nat. Forest, 1926

Erad. Type	White Pine Type (Age Classes) 1-10	11-20	21-40	41-60	61 80	81 100	101 200	201+	not Classed	Totals Acres	Totals %	Non White Pine Types (Age Classes) 1-10	11-20	21-40	41-60	61 80	81 100	101 200	200+	not Classed	Totals
D.M.						3407	9590	5435		18432	15						235	3041	42		3318
O.M.						2304	45275	2745		50324	41							53612	94		53706
D.P.				980	115					1095	1				560						560
O.P.				709	115	145				969	1			230	265		285				780
D.R.	593	518	6912	35						8058	6	778	210	3422							4410
O.R.	19221	13029	7319							39569	32	20	3281	17685	45						21031
Str.									4595	4595	4									1007	1007
Rock																				270	270
Brush																				36214	36214
Sub-Alpin																				6995	6995
Cle-aring																				413	413
Total	19814	13547	14231	1724	230	5856	54865	8180	4595	123042	100	798	3491	21337	870		520	56653	136	44399	128704

Table No. 4

Acres Reconnaissanced by Eradication Types and Number *Ribes lacustre* per Acre Classes

Prichard and Carter Ranger Districts, Coeur d'Alene National Forest, 1926.

Erad. Type	Number of Ribes lacustre per Acre Classes																						Totals
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	1501 2000	
D. M.	1444	1050	140	405		300		1090	225		524													5178
O. M.	3717	2245	1785	1080	485	310	630	350	290	110		320	795	390	80			60	270	10				13027
D. P.	325	50	495																					870
O. P.	200	70					60																	330
D. R.	1390	570	355	210	1010	135	510	150	280	240	440	400		20		140								5850
O. R.	1385	2375	1575	615				280	400	155	200		25	55		80						25		7180
Str.	190		50	30	200	205		50		65	150	35	245	161	45	317	179	194	46	41	8	10		2221
Brush	390	520		15																280				1205
Rock					15	30																	1/4	45 1/4
Total	9041	6980	4400	2355	1710	980	1200	1920	1195	570	1314	755	1075	626	125	537	179	254	316	331	8	35	1/4	35906 1/4

Table No. 5

Acres Reconnaissanced by Eradication Types and Number of Ribes viscosissimum per Acre Classes
Prichard and Carter Ranger Districts, Coeur d'Alene National Forest, 1926

Erad. Type	Number of Ribes viscosissimum per Acre Classes																					
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	Total
D. M.	3573	915	690																			5178
O. M.	6532	2980	350	700	760	485	385			130		205				360	60		80			13027
D. P.	455	165	250																			870
O. P.	260	70																				330
D. R.	2320	2040	955	180	105	140			20			90										5850
O. R.	1425	1120	400	1575	390	690		555	220			350	120	335								7180
Str.	1672	332	85	55	6	50	20										1					2221
Brush	290	520	65	140							175		15									1205
Rock	45¼																					45¼
Total	16572¼	8142	2795	2650	1261	1365	405	555	240	130	175	645	135	335		360	61		80			35906¼

An examination of Table No. 4 shows that R. lacustre has a wide distribution. It is present in every eradication type, varying widely in number per acre from) to an average of 1750 per acre.

Referring to Table No. 5 it is evident that R. viscosissimum has a more restricted range than R. lacustre. With the exception of the open pole type on which there is insufficient information the open eradication types show a greater distribution of R. viscosissimum than do the dense eradication types. Due to its inability to withstand dense shade, R. viscosissimum is the first Ribes in this locality to be shaded out.

An examination of Table No. 6 shows that G. inermis and G. irrigua are practically restricted in their distribution to rock and stream types. In these situations, when they occur, they are often in great profusion, on areas limited in size, near water, making conditions favorable to their eradication by chemical means.

Table No. 6

Acres Reconnaissanced by Eradication Types and Number of *G. inermis* and *G. irrigua* per Acre Classes. Prichard and Carter Ranger Districts, Coeur d'Alene National Forests, 1926

	Number of G. inermis and G. irrigua per Acre Classes																				
Erad. Type	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	Totals
D.M.	5178																				5178
O.M.	12837	110	80																		13027
D.P.	870																				870
O.P.	330																				330
D.R.	5500	350																			5850
O.R.	6310	600	270																		7180
Str.	1319	255	80	10	250	92								65					150		2221
Brush	1205																				1205
Rock	$\frac{1}{4}$				15															30	$45\frac{1}{4}$
Total	$33549\frac{1}{4}$	1315	430	10	265	92								65					150	30	$35906\frac{1}{4}$

Table No. 7

Acres Reconnaissanced by Eradication Types and Number of Ribes per Acre Classes

Prichard and Carter Ranger Districts, Coeur d'Alene National Forest, 1926

Erad. Type	Number of all Ribes per Acre Classes																						
	0	1-10	11 20	21 30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	1501 2000	Totals
D. M.	1444	1050	140	405			300	700	225	390	524													5178
O. M.	2352	1765	510	2045	1240	640	270	260	945	190	325	560	675	200	80	240	130	180	410	10				13027
D. P.	75	50	745																					870
O. P.	200		70				60																	330
D. R.	725	970	375	225	710	430	390	140	465	70	240	560	350			200								5850
O. R.	400	1140	450	505	655	1180	600	170		195	165	590	435	390		200	80					25		7180
Str.	10		15	80	140	40	60	5	110	115	100	110	115	246	105	295	162	258	195	42	8	10		2221
Brush	10	520	65	140							175			15						280				1205
Rock									15											30			1/4	45 1/4
Total	5216	5495	2370	3400	2745	2290	1680	1275	1760	960	1529	1820	1575	851	185	935	372	438	605	362	8	35	1/4	35906 1/4

Table No. 7 gives the number of acres of white pine type intensively reconnaissanced classified according to eradication type and number of Ribes per acre classes.

It is evident that this is a region of abundant Ribes growth, and that they occur in varying amounts per acre.

For purposes of comparison certain points are brought out from Tables 4, 5, 6, and 7 and presented together in Table No. 8

Table No. 8

Ribes Species	Percent of Total Acreage which has		
	No Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	25	20	55
R. viscos.	46	23	31
G. inermis G. irrigua	93	4	3
All Ribes	14½	15½	70

Ten Ribes per acre is taken as a dividing line, because it is generally considered that areas supporting a Ribes growth of ten or less per acre can most economically be eradicated by the scout method, as explained in the report of "Development of Scouting Methods", in this year's annual report. Areas having more than ten Ribes per acre are eradicated by either crew methods of hand pulling, or by the application of chemicals.

Table No. 8 gives an indication of the eradication problem in this region.

Table No. 9 is developed from Tables Nos. 4, 5, 6, and 7. The method of arriving at the average number of Ribes per acre is as follows:

The number of acres in each eradication type and each number of Ribes class was multiplied by the average number of Ribes in that number of Ribes class. The total of these products divided by the total acreage in the eradication type gave the average number of Ribes for that eradication type.

Table No. 9

Number of Ribes per Acre by Ribes Species and Eradication Types

Coeur d'Alene National Forest, 1926

Erad. Type	No. of Acres Reconn.	Ribes Species per Acre			
		R. lacustre	R. viscoss	G. inermis & G. irrigua	Total Ribes
D. M.	5178	32.5	2.9	0	35.4
O. M.	13027	42.7	21.1	0.1	63.9
D. P.	870	8.8	5.3	0	14.1
O. P.	330	11.1	1.1	0	12.2
D. R.	5850	43.7	8.6	0.3	52.6
O. R.	7130	27.0	36.0	.9	63.9
Str.	2221	165.2	3.7	42.2	211.1
Brush	1205	147.7	21.4	0	169.1
Rock					
Totals	35906	48.3	17.7	3.4	69.4

The following facts seem evident from an examination of Table No. 8.

(1) R. lacustre is the most abundant and widely distributed of the Ribes in this area.

(2) Density of stand appears to have little or no effect on the number of R. lacustre per acre.

(3) The greatest number of R. lacustre per acre occurred in the non-timbered types.

(4) The smallest number of R. lacustre per acre was found in the pole types. Owing to the fact that only a small acreage of pole stands was found it is believed that the information on pole stands has an insufficient basis.

(5) With the exception of the pole stands, R. viscossissimum is most abundant in the open eradication type, being greatest numerically in the brush type.

(6) G. inermis and G. irrigua are nearly absent from all eradication types except stream and rock. In the latter type G. irrigua was found in the highest concentration on rock slides.

(7) In considering the total Ribes per acre, it is evident that the non-timbered types support three or four times as many Ribes per acre as the timbered areas.

(8) With the exception of the pole types the open eradication types show a greater number of Ribes per acre than do the dense eradication types.

(8) Analysis of Costs and Time of Control Reconnaissance on Prichard and Carter Ranger Districts, Coeur d'Alene National Forest, 1926.

Table No. 10 shows the items making up the total costs of control reconnaissance on the Coeur d'Alene National Forest June 27 to August 31, 1926.

Table No. 10

Costs of Reconnaissance, Federal, 1926 on Prichard and Carter Ranger Districts, Coeur d'Alene National Forest, Idaho.

	Travel			Subsistence			Equipment		Grand
Salaries	Auto	Other	Meals	Meals	Rate per Meal	Cost	Charges	Frt.	Total
				585	* .283	165.46	55.34	6.22	
1505.61	149.33	12.00	15.40	69	.40	27.60			
				Meals paid for as taken		208.85			
Total 1505.61	149.33	12.00	15.40			401.91	55.34	6.22	2145.81

* No cooking charge. Men prepared their own meals.

The salary item is based on the following salaries paid:

1 Field Supervisor @ $241.67 per month
1 Field Assistant @ 110.00 " "
3 " " @ 100.00 " "
2 " " @ 90.00 " "

The automobile expense was that caused by the use of two personally owned cars at $0.07 per mile. It covers the cost of transporting men and equipment from Spokane to the place of work and return. Owing to the fact that the area worked is well covered by roads, the autos were of much service in moving camp, taking men to work, etc. Much time was saved by this method. This was particularly true this year since owing to the rapid way in which the country was gone over, it was economical to move camps often. It would not have been possible to cover as much territory without the use of automobiles.

The "Other Travel" expense of $12.00 consists of 3 fares of $4.00 each from Spokane to Prichard via stage.

"Travel meals" are those taken enroute.

The "Subsistence" expenses are self explanatory. Meals at $.283 were those taken in camp, the men doing their own cooking. Meals at $.40 were those taken at logging camps.

"Meals paid for as taken" include the cost of meals at varying rates, only in a few instances over $.50 per meal.

The "equipment charge" of $55.34 was made up as follows: The total equipment charge for the Western Office of Blister Rust Control for 1926 was $1138.78. The allotment for Federal control reconnaissance for the fiscal year 1927 amounted to 6.09% of the total funds allotted to western blister rust work in the fiscal year 1927. Hence 6.09% of $1138.78 equals $69.35, $55.34 of which was chargeable to control reconnaissance on the Coeur d'Alene, and the remainder to control reconnaissance on the St. Joe, in proportion to the money spent on each forest.

"Equipment Freight" was the expense of shipping tentage and other field equipment by freight from Spokane to Prichard and return.

Table No. 11 shows the distribution of time on control reconnaissance on the Coeur d'Alene National Forest from June 27 to August 31, 1926.

Table No. 11

Analysis of Time, Control Reconnaissance on Coeur d'Alene National Forest, June 27 to August 31, 1926.

Type of Work	Actual Time	
	Man Days	Percentages
Reconnaissance Intensive	100	25.87
Reconnaissance Extensive	89½	23.16
Total Data Taking Work	189½	49.03
Office	74½	19.28
Camp Packing	36	9.32
Travel	33½	8.67
Rain, No Work	3½	.91
Sundays - Holidays	36½	9.42
Supervision	13	3.37
Total Other Activities	197	50.97
Grand Total	386½ 386½	100.00

An explanation is needed in regard to certain points in Table No. 3

It may be observed that "stream type" is divided between "white pine type" and "non-white pine type". If the stream type was actually bordering or bisecting a white pine type, it was thrown under that heading, otherwise it was classified under "non-white pine type." This was the only exception to the practise of including only white-pine types under that heading.

It is very probably that a certain portion of the "brush" type was actually white pine site. No attempt was made to classify it according to its potentialities. Accordingly it was all considered as non-white pine type.

"Subalpine" was placed in the eradication type column, not because it is to be considered as an eradication type, but simply because in that case neither the age class nor eradication type was known.

The determination of timber types, age-classes, and eradication types of stands other than white pine is not important by itself. Its value lies when it is considered in its geographical relation to white pine. It is important to know something of the growth immediately surrounding a white pine stand, so that an estimate on the cost of eradicating the Ribes from a protective strip can be more accurately made. It is for this reason that the age-classes and eradication types of non-white pine types were determined.

An examination of Table No. 3 shows the following facts:

(1) Nearly 57 per cent of the strictly timber types is white pine.

(2) Only 22 per cent of the total white pine acreage is classified as dense eradication types.

(3) The range of age classes falling into the different eradication types was as follows: Mature eradication types included age classes from 81 years up; pole eradication types 41 to 80 year age classes; and reproduction eradication types included 1 to 40 year age classes.

Table Nos. 4, 5, 6 and 7 show the number of white pine type acres intensively reconnaissanced, classified by eradication type and number of Ribes per acre classes for individual Ribes species and for all species.

The total time charged to data taking work was as follows: 204 man days, or 52.77% of the total charged to intensive reconnaissance; and 182 ½ or 47.23% of the total charged to extensive reconnaissance.

The derivation of these figures was as follows, and was for purpose of allocating the "Total Other Activities" to the two divisions of "Data Taking Work".

$$\frac{100 \text{ (Man Days Intensive Reconnaissance)}}{189\tfrac{1}{2} \text{ (Man Days Data Taking Work)}} = 52.77\% \text{ of Total Data Taking Time Devoted to Intensive Reconnaissance}$$

52.77% times 386½, the Total Man Days in Field = 204 Man Days Chargeable to Intensive Reconnaissance

In a similar manner the figures for extensive reconnaissance were derived.

Cost charged to Intensive Reconnaissance, $2145.81 X 52.77% = **$1132.34**

Cost charged to Extensive Typing, $2145.81 X 47.23% = $1013.47

Cost per Section Intensive Reconnaissance,

$$\frac{\text{Cost Intensive Reconnaissance } \$1132.34}{\text{Sections Worked } 103} = \$ \ 10.99$$

Cost per Section Typed only,

$$\frac{\text{Cost, Typing only } \$1013.47}{\text{Sections Typed } 311} = \$ \ 3.26$$

Cost per Section of All Sections Worked,

$$\frac{\text{Total Cost of Control Reconn. } \$2145.81}{\text{Total Sections Worked } 414} = \$ \ 5.18$$

Cost per Acre Intensive Reconnaissance,

$$\frac{\text{Cost Intensive Reconnaissance } \$1132.34}{\text{Acres Worked } 64,650} = \$ \ .0175$$

Cost per Acre Typed only,

$$\frac{\text{Cost, Typing Only } \$1013.47}{\text{Acres Worked } 187,096} = \$ \ .0054$$

Cost per Acre, All Acres Worked,

$$\frac{\text{Total Cost, Control Reconnaissance } \$2145.81}{\text{Total Acres Worked } 251,746} = \$ \ .0085$$

The total time charged to data taking work was as follows: 204 man days, or 52.77% of the total charged to intensive reconnaissance; and 182½ or 47.23% of the total charged to extensive reconnaissance.

The derivation of these figures was as follows, and was for purpose of allocating the "Total Other Activities" to the two divisions of "Data Taking Work".

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52.77% times 386½, the Total Man Days in Field=204 Man Days Chargeable to Intensive Reconnaissance

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Cost per Section Typed only,

$$\frac{\text{Cost, Typing only } 1013.47}{\text{Sections Typed } 311} = \$\ \text{[illegible]}$$

Cost per Section of All Sections Worked,

$$\frac{\text{Total Cost of Control Reconn. } \$2145.81}{\text{Total Sections Worked } 414} = \$\ 5.18$$

Cost per Acre Intensive Reconnaissance,

$$\frac{\text{Cost Intensive Reconnaissance } \$1132.34}{\text{Acres Worked } 64{,}650} = \$\ .0175$$

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Cost per Acre, All Acres Worked,

$$\frac{\text{Total Cost, Control Reconnaissance } \$2145.81}{\text{Total Acres Worked } 251{,}746} = \$\ .0085$$

Average Cost per Man Day,

$$\frac{\text{Total Cost}}{\text{Total Man Days}} \quad \frac{\$2145.81}{386.5} = \$\,5.55$$

Average No. Days per Section Intensive,

$$\frac{\text{Total Days Intensive Reconn.}}{\text{Sections Worked}} \quad \frac{204}{103} = 1.98 \text{ days}$$

Average No. Days per Section Typed Only

$$\frac{\text{Total Days Typing}}{\text{Sections Typed}} \quad \frac{182.5}{311} = .587 \text{ days}$$

Average No. Days per Section, all Sections Worked

$$\frac{\text{Total Man Days}}{\text{Total Sections Worked}} \quad \frac{386.5}{476} = .93 \text{ days}$$

C. Palouse Division, St. Joe National Forest

(1) Geographical Description

The Palouse Division of the St. Joe National Forest is that forest area surrounding Dennis Buttes and Bald Mountain. It includes the head waters of Charlie and Santa Creek drainages on the north, and head waters of Palouse River and Meadow Creek flowing in a general southerly direction. Federal reconnaissance was limited to the southern portion of the forest, on Meadow Creek and Palouse River.

The topography consists of low rolling hills, interspersed with many small streams, some of which are intermittent. Elevations range from approximately 2800 to possibly 4000 feet.

(2) Economic Development

The chief towns in this region are Potlatch, Princeton and Harvard, situated just southwest of the forest boundary. Good general stores are present in these towns.

The chief industries in the forest are small lumbering operations and ranching. Formerly there were a few placer mining activities on the streams.

The lumbering operations consist mainly of small, portable sawmills, situated near the cutting operations. There is a large sawmill situated at Potlatch owned by the Potlatch Lumber Company.

Small ranches occur on the meadows throughout the forest.

The forest headquarters for the Palouse Division is located at Princeton. The entire division is included in one ranger district. Since it is separated from the Main Division of the St. Joe, it is treated very much as a separate National Forest. Owing to the large local demand for timber by the surrounding ranches of the non-forested Palouse country, there is close utilization of forest products, and the administration of the Palouse Division is somewhat similar to that which obtains in the Eastern United States. There is a consequent higher valuation of stumpage due to these conditions, and an attempt at a management plan giving continuous yield.

(3) Accessibility

The region is readily accessible by means of many roads passable by auto, at least when dry conditions prevail. There is a good net work of trails.

(4) Forest Types Found

There is a great mixture of forest types, without definite type lines separating them.

White pine occurs in mixture with all other species on cool north facing slopes.

Douglas fir-larch-white fir occurs on the warmer exposures. Yellow Pine Douglas fir is found on the hottest, driest exposures.

Cedar is found in the broad bottoms of the wider streams.

Brush occurs in dense growth on certain of the ridges.

(5) Age Classes Represented

It is difficult to ascribe definite age classes to the stands. They often approach an uneven aged condition. There is a large amount of 21-40 year age classes. No age classes younger than 20 years were found, nor any age classes from 61-100. Considerable mature and over mature age classes occur.

(6) Ribes Conditions

Four species of Ribes occur in the area, named in order of decreasing abundance: R. lacustre, R. viscosissimum, Grossularia inermis and R. petiolare.

R. lacustre is widely distributed in all eradication types. It is least in the reproduction types and most abundant along streams.

R. viscosissimum occurs most abundantly in the open types. It occurs very rarely on streams.

G. inermis occurs in patches on stream type only.

R. petiolare was not found on the actual area reconnaissanced, but was found in the region along streams in meadows where the soil was deep and moist.

(7) Results Obtained

Table No. 12 shows the location of reconnaissance performed, the number of sections covered in whole or in part, and the number of acres.

Table No. 12

Summary of Acres Covered by Reconnaissance

Palouse Division - St. Joe N.F.

Twp.	Range	Intensive			Typed Only			Grand Total	
		Sections by No.	Total		Sections by No.	Total			
			Sec.	Acres		Sec.	Acres	Sec.	Acres
42N	2 W	2,11,14,26	4	2560	1,3.4,5,6,7,8,9 10,12,13,15,16, 17,18,19,20,21, 22,23,24,25,27, 28,29,30,31,32, 33,34,35,36	32	20480	36	23040
42N	3 W	2	1	640	1,3.4,10,11,12	6	3840	7	4480
43N	3 W	26,34	2	1280	8,15,16,17,20, 21,22,23,24,25, 27,28,33,35,36	15	9050	17	10880
Totals			7	4480		53	33370	60	37850

Table No. 13 gives the total acres reconnaissanced divided into white pine types and non white pine types, and still further classified according to eradication types and age classes.

Table No. 13

Acres Reconnaissanced by Age Classes and Eradication Types

Palouse Division, St. Joe National Forest, Idaho. 1926

	White Pine Types - Age Classes										Non-White Pine Types - Age Classes									
Erad. Types	1-10	11-20	21-40	41-60	61-80	81 100	101 200	200+	Not Classed	Total	1-10	11-20	21-40	41-60	61-80	81 100	101 200	200+	Not Classed	Total
D. M.							895	25		920										
O. M.							5765	1935		7700							2670	65		2735
D. P.																				
O. P.				1810						1810				3285						3285
D. R.			2635						25	2660			2130							2130
O. R.			9505							9505			5640							5640
Str.									870	870									95	95
Rock																				
Brush																			455	455
Clear.																			45	45
Total			12140	1810			6660	1960	895	23465			7770	3285			2670	65	595	14385

It may be observed from Table No. 13 that there is a scarcity of age classes found. Only four age classes were recognized in the white pine types. Difficulty was experienced in determining the age class and eradication types of many of the stands of timber found.

Of the strictly timbered types reconnaissanced, 22,595 acres, or 62 per cent were considered as white pine type.

There were 19,015 acres of open white pine eradication types, exclusive of stream type, or 84 percent of the white pine type were open eradication types.

Tables No.s 14, 15, 16 and 17 show the number of acres of white pine type intensively reconnaissanced classified according to eradication types and number of Ribes per acre classes for each Ribes species and for all Ribes species.

Table No. 14

Acres Reconnaissanced by Eradication Types and No. of Ribes lacustre per Acre Classes
Palouse Division - St. Joe National Forest 1926

	Number of Ribes lacustre per Acre Classes																					
Erad. Type	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	Totals
D.M.						~~[illegible]~~	~~100~~															~~[illegible]~~
O.M.					160	30	130															320
D.P.																						
C.P.	310																					310
D.R.	340	335								25												700
O.R.	1040	430																				1470
Str.										15		15	70	15		55		20				190
Br.																						
Rock																						
Total	1690	765			160	30	130			40		15	70	15		55		20				2990

Table No. 15
Acres Reconnaissanced by Eradication Types and Number of Ribes viscosissimum
Per Acre Classes - Palouse Division - St. Joe National Forest, 1926

Erad. Type	Number of Ribes viscosissimum per Acre Classes																				
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	Totals
D. M.	~~100~~	~~50~~																			~~150~~
O. M.	130	190																			310
D. P.																					
O. P.	160			150																	310
D. R.	280	335		60			25														700
O. R.	430	395	240	405																	1470
Str.	190																				190
Brush																					
Rock																					
Total	1190	920	240	615			25														2990

Table No. 16

Acres Reconnaissanced by Eradication Types and Number of G. inermis per Acre Classes

Palouse Division - St. Joe National Forest, 1926

	Number of G. inermis per Acre Classes																				
Erad. Type	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	Totals
D. M.	~~[illegible]~~																				~~[illegible]~~
O. M.	320																				320
D. P.																					
O. P.	310																				310
D. R.	700																				700
O. R.	1470																				1470
Str.	170	20																			190
Brush																					
Rock																					
Total	2970	20																			2990

Table No. 17

Acres Reconnaissanced by Eradication Types and Number of Ribes per Acre Classes

Palouse Division - St. Joe National Forest, 1926

	Number of all Ribes per Acre Classes																				
Erad. Type	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	31 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	Totals
D. M.							~~120~~														~~120~~
O. M.						160	160														320
D. P.																					
O. P.	160			150																	310
D. R.	90	440	85	60									25								700
O. R.		825	240	405																	1470
Str.										15		15	70	15		55		20			190
Brush																					
Rock																					
Totals	250	1265	325	615		160	160			15		15	95	15		55		20			2990

It is evident from table No. 14 that R. lacustre was found present in every eradication type except open pole.

R. lacustre was found to have the largest range in number per acre in the stream type.

Table No. 15 shows the situation in regard to R. viscosissimum.

It is aparent from Table No. 16 that G. inermis is only a small factor in the eradication problem on areas reconnaissanced.

Table No. 17 shows the number of acres intensively reconnaissanced classified according to eradication types and total number of Ribes per acre classes.

The value of tables similar to Table No. 17 lies in their use as a basis for estimating cost of Ribes eradication. From the results of Ribes eradication work it is possible to arrive at varying costs of eradication per acre by eradication types and number of Ribes per acre classes. The application of such costs to table No. 17 would give a basis for the cost of eradicating the Ribes in a given region.

Certain points are brought out from Tables 14,15,16 and 17 and are presented together in Table No. 18 for purposes of comparison.

Table No. 18

Ribes Species	Percent of Total Acres Which have		
	No. Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	56 1/2%	25 1/2%	18%
R. viscosissimum	40%	30 1/2%	29 1/2%
G. inermis	99%	1 %	----
All Kinds	8%	43 %	49 %

Table No. 18 is of value in studying the eradication problem in this region, in that it gives an indication of the concentration in which Ribes occur.

Table No. 19 is derived from Tables Nos. 14, 15, 16 and 17, by the method described on page . It shows the average number of Ribes found by eradication types and by Ribes species.

Table No. 19

Number of Ribes Per Acre by Ribes Species and Eradication Types

Palouse Division, St. Joe National Forest, 1926

Erad. Type	No. of Acres Reconn.	Ribes Species per Acre			
		R. lacustre	R. viscosa	G. inermis & G. irrigua	Total Ribes
D.M.					
O.M.	320	44.1	3.0		47.1
D.P.					
O.P.	310		12.1		12.1
D.R.	700	5.4	6.5		11.9
O.R.	1470	1.5	10.7		12.2
Str.	190	180.5		.5	181.0
Total	2990	18.2	8.3	Trace	26.5

Attention is called to Tables No. 18 and 19. It is seen that while there is a lower per cent of the area reconnaissanced having more than 10 R. lacustre per acre than there is having more than 10 R. viscosissimum per acre, nevertheless there are over twice as many R. lacustre per acre as there are R. viscosissimum, on the average. These facts would indicate that

(1) R. viscosissimum had a wider, more uniform distribution with less number per acre than R. lacustre, and

(2) that R. lacustre occurred in greater concentration where found than R. viscosissimum. As a partial explanation of this it may be recalled that 84 % of the white pine type was of open eradication types.

(3) Analysis of Costs and Time of Control Reconnaissance on Palouse Division of the St. Joe National Forest, 1926.

Control reconnaissance was conducted on the Palouse Division of the St. Joe National Forest from September 1 to September 15, 1926.

Table No. 20

Costs of Reconnaissance Federal Lands on Palouse Division of St. Joe National Forest, Idaho, Sept. 1 to Sept. 15 1926

	Travel			Subsistence			Equipment		
Salaries	Auto	Other	Meals	Meals	Rate per Meal	Total Cost	Charge	Frt.	Grand Total
265.97	65.96		4.00	50	* .295	14.77	14.00		
				Meals and Lodging paid for as taken.		87.80			
$265.97	65.96		4.00			102.57	14.00		452.50

* No cooking charge. Men prepared their own meals.

The salary item is based on the following salaries paid:

1 Field Supervisor	@ $241.67	per month
1 Field Assistant	@ 110.00	" "
3 Field Assistants	@ 100.00	" "
1 Field Assistant	@ 90.00	" "

The automobile expense was that incurred by the use of personally owned cars at seven cents per mile. It covers the total cost of transporting men and equipment from Spokane to the Palouse Division and return to Spokane. Owing to the fact that the area worked contained so many roads, the autos were of great service in working the country. In fact, had there been no automobiles, it would not have been possible to cover as much country as was done.

"Travel Meals" were those taken enroute.

"Subsistence" expense includes the cost of meals self cooked in camp, and board at a ranch at .30 per meal. It also includes a few days board and lodging at the Potlatch hotel incurred when work was being started.

The "Equipment Charge" has been explained in the discussion of costs of Control Reconnaissance on the Coeur d'Alene National Forest.

(3) Analysis of Costs and Time of Control Reconnaissance on Palouse Division of the St. Joe National Forest, 1926.

Control reconnaissance was conducted on the Palouse Division of the St. Joe National Forest from September 1 to September 15, 1926.

Table No. 20

Costs of Reconnaissance Federal Lands on Palouse Division of St. Joe National Forest, Idaho, Sept. 1 to Sept. [illegible] 1926

Travel				Subsistence			Equipment		
Salaries	[illegible]	Other	Meals	Meals	Rate per Meal	Total Cost	Charge	Frt.	Grand Total
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]*	14.77	[illegible]		
				Meals and lodging paid for as taken.		7.[illegible]			
265.97	65.96		4.00			[illegible]	1.[illegible]		452.50

* No cooking charge. Men prepared their own meals.

The salary item is based on the following salaries paid:

1 Field Supervisor @ $241.67 per month
1 Field Assistant @ 110.00 " "
2 Field Assistants @ 100.00 " "
1 Field Assistant @ 90.00 " "

The automobile expense was that incurred by the use of personally owned cars at seven cents per mile. It covers the total cost of transporting men and equipment from Spokane to the Palouse Division and return to Spokane. Owing to the fact that the area worked contained so many roads, the autos were of great [illegible] in working the country. In fact, had there been no automobiles, it [illegible] not have been possible to cover as much country as was done.

"Travel Meals" were those taken enroute.

"Subsistence" expense includes the cost of meals self-cooked in camp, and board at a ranch at .50 per meal. It also includes a few days board and lodging at the Potlatch hotel incurred when work was being started.

The "Equipment Charge" has been explained in the discussion of costs of Control Reconnaissance on the Coeur d'Alene National Forest.

Table No. 21 shows the way time was spent in performing control reconnaissance on the Palouse Division of the St. Joe National Forest, September 1 to September 15, 1926.

Table No. 21

Analysis of Time, Control Reconnaissance, on Palouse Division, St. Joe National Forest, Sept. 1 to 15 1926

Type of Work	Actual Time			
	Man Days		Percentages	
Intensive Reconnaissance	$7\frac{1}{2}$		11.19+	
Typing only	15		22.39	
Total Data Taking Work		$22\frac{1}{2}$		33.58
Office	20		29.85	
Camp	1		1.49	
Travel	$12\frac{1}{2}$		18.66	
Rain, no Work	2		2.99	
Sundays, Holiday	6		8.95	
Supervision	3		4.48.	
Total Other Activities		$44\frac{1}{2}$		66.42
Grand Total	67	67	100	.100

The total time charged to data taking work is as follows: 22 1/3 man days or 33.33% of the total time is charged to intensive reconnaissance, and 44 2/3 man days or 67.67% is charged to extensive reconnaissance. The derivation of these figures is shown in detail in the discussion of the analysis of time on the Coeur d'Alene National Forest.

It may be observed in Table No. 21 that nearly 30 per cent of the time was spent in office work. During the first two weeks of September nearly half of the days were rainy. This time was spent in correlating township type maps, both on the St. Joe and Coeur d'Alene Forests, working up summaries, and getting reports and maps in shape at the end of the season. The fact that both crews were together during part of the rainy weather facilitated the jibing of type lines on adjoining townships worked by each crew.

The large number of rainy days materially increased the cost per acre of reconnaissance performed on the Palouse Division, as is shown in the following figures.

Cost Charged to Intensive Reconnaissance,

33.33% X 452.50 = $150.83

Cost Charged to Typing Only, 66.67% X 452.50 = $301.67

Cost Per Section Intensive Reconnaissance,

$$\frac{\text{Cost } \$150.83}{\text{Sections Worked } 7} = \$\ 21.55$$

Cost per Section, Typed Only,

$$\frac{\text{Cost } \$301.67}{\text{Sections Typed } 53} = \$\ 5.69$$

Cost per Section, all Sections Worked,

$$\frac{\text{Cost } \$452.50}{\text{Sections Worked } 60} = \$\ 7.54$$

Cost per Acre Intensive Reconnaissance,

$$\frac{\text{Cost } \$150.83}{\text{Acres Worked } 4{,}480} = \$\ .0337$$

Cost per Acre Typing Only,

$$\frac{\text{Cost } \$301.67}{\text{Acres Worked } 33{,}370} = \$\ .0090$$

Cost per Acre all Acres Worked,

$$\frac{\text{Cost } \$452.50}{\text{Acres Worked } 37{,}850} = \$\ .0120$$

Average Cost per Man Day,

$$\frac{\text{Cost } \$452.50}{\text{Man Days } 67} = \$\ 6.75$$

Ave. No. Days per Section Intensive Reconnaissance,

$$\frac{\text{Man Days } 22.33}{\text{Sections } 7} = 3.19 \text{ days}$$

Ave. No. Days per Section Typed Only,

$$\frac{\text{Man Days } 44.67}{\text{Sections } 53} = .84 \text{ days}$$

Ave. No. Days per Section All Sections Worked,

$$\frac{\text{Man Days } 67}{\text{Sections } 60} = 1.12 \text{ days}$$

D. Summary of Control Reconnaissance on the Coeur d'Alene National Forest and Palouse Division of the St. Joe National Forest, Combined.

The results of control reconnaissance on the two forests are herein summarized.

Table No. 22 shows the total number of sections and acres reconnaissanced intensively and extensively on both forests.

Table No. 22

Area Reconnaissanced on Coeur d'Alene and St. Joe National Forests Combined, 1926.

Area	Intensive Reconn.		Typed Only		Total Area Worked	
	Sections	Acres	Sections	Acres	Sections	Acres
C. D. A.	103	64,650	311	187,096	414	251,746
Palouse Div.	7	4,480	53	33,370	60	37,850
Totals	110	69,130	364	220,466	474	289,596

Tables Nos. 23, 24, 25 and 26 show the total acres of white pine type intensively reconnaissanced on both forests classified according to eradication types and number of Ribes per acre classes for each Ribes species and for all Ribes. The data presented in these tables will not be discussed, since the tables from which these were derived have already been discussed in this report.

Table No. 23

Acres Reconnaissanced by Eradication Types and Number of R. lacustre per Acre Classes

Coeur d'Alene National Forest and Palouse Division of St. Joe National Forest Combined

1926

	Number of Ribes lacustre per Acre Classes.																						
Erad. Type	0	1-10	11-20	21-30	31 40	41 50	51 60	61 70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	751 1000	1001 1500	1501 2000	Totals
D.M.	1444	1050	140	405		300		1090	225		524													5178
O.M.	3717	2345	1785	1080	645	340	760	350	290	110		320	795	390	80			60	270	10				13347
D.P.	325	50	495																					870
O.P.	510	70					60																	640
D.R.	1730	905	355	210	1010	135	510	150	280	265	440	400		20		140								6550
O.R.	2425	2805	1575	615				280	400	155	200		35	55		80						25		8650
Str.	190		50	30	200	205		50		80	150	50	315	176	45	372	179	214	46	41	8	10		2411
Brush	390	520		15																280				1205
Rock					15	30																	1/4	45¼
Total	10731	7745	4400	2355	1870	1010	1330	1920	1195	610	1314	770	1145	641	125	592	179	274	316	331	8	35	1/4	38896¼

Table No. 24

Acres Reconnaissanced by Eradication Types and Number of R. viscosissimum per Acre Classes

Coeur d'Alene National Forest and Palouse Division of St. Joe National Forest Combined

1926

	Number of Ribes viscosissimum per Acre Classes																			
Erad. Type	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	Totals
D. M.	3573	915	690																		5178
O. M.	6662	3170	350	700	760	485	385			130		205				360	60		80		13347
D. P.	455	165	250																		870
O. P.	420	70		150																	640
D. R.	2600	2375	955	240	105	140	25		20			90									6550
O. R.	1855	1515	640	1980	390	690		555	220			350	120	335							8650
Str.	1862	332	85	55	6	50	20										1				2411
Brush	290	520	65	140							175		15								1205
Rock	45¼																				45¼
Total	17762¼	9062	3035	3265	1261	1365	430	555	240	130	175	645	135	335		360	61		80		38896¼

Table No. 25

Acres Reconnaissanced by Eradication Types and Number of G. inermis and G. irrigua per Acre Classes

Coeur d'Alene National Forest and Palouse Division of St. Joe National Forest Combined - 1926.

Erad. Type	Number of G. inermis and G. irrigua per Acre Classes																				
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71 80	81 90	91 100	101 125	126 150	151 175	176 200	201 250	251 300	301 400	401 500	501 750	Totals
D. M.	5178																				5178
O. M.	13157	110	80																		13347
D. P.	870																				870
O. P.	640																				640
D. R.	6200	350																			6550
O. R.	7780	600	270																		8650
Str.	1489	275	80	10	250	92								65					150		2411
Brush	1205																				1205
Rock	¼				15															30	45¼
Total	36519¼	1335	430	10	265	92								65					150	30	38896¼

Table No. 26

Acres Reconnaissanced by Eradication Types and Number of Ribes per Acre Classes

Coeur d'Alene National Forest and Palouse Division of St.Joe National Forest, Combined - 1926.

Erad. Type	Number of all Ribes per Acre Classes																							Totals
	0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001-1500	1501-2000	
D. M.	1444	1050	140	405			300	700	225	390	524													5178
O. M.	2352	1765	510	2045	1240	800	430	260	945	190	325	560	675	200	80	240	130	180	410	10				13347
D. P.	75	50	745																					870
O. P.	360		70	150			60																	640
D. R.	815	1410	460	285	710	430	390	140	465	70	240	560	375			200								6550
O. R.	400	1965	690	910	655	1180	600	170		195	165	590	435	390		200	80					25		8650
Str.	10		15	80	140	40	60	5	110	130	100	125	185	261	105	350	162	278	195	42	8	10		2411
Brush	10	520	65	140							175			15						230				1205
Rock									15											30			1/4	45 1/4
Total	5466	6760	2695	4015	2745	2450	1340	1275	1760	975	1529	1335	1670	866	185	990	372	458	605	362	8	35	1/4	38896 1/4

Certain points are brought out from Tables Nos. 23, 24, 25, and 26 and are presented in Table No. 27 for purposes of comparison.

Table No. 27

Per cent of Total Acres of White Pine Type Reconnaissanced Intensively which have varying amounts of Ribes per Acre, by Ribes Species.

	Per cent of Total Acres which have		
Ribes Species	No. Ribes per Acre	1 to 10 Ribes per Acre	More than 10 Ribes per Acre
R. lacustre	28	19 1/2	52 1/2
R. viscosissimum	46	23 1/2	30 1/2
G. inermis) G. irrigua)	93 1/2	4	2 1/2
All Ribes	14	17 1/2	68 1/2

Table No. 28 which is derived from Tables Nos. 23, 24, 25, and 26, is shown below.

Table No. 28

Number of Ribes per Acre by Ribes Species and Eradication Types Coeur d'Alene National Forest and Palouse Division of St. Joe National Forest 1926

Erad. Type	No. of Acres Reconn.	Ribes Species per Acre			
		R. lacustre	R. viscoss	G. inermis.& G. irrigua	Total Ribes
D.M.	5178	32.5	2.9		35.4
O.M.	13347	42.7	20.7	.1	63.5
D.P.	870	8.8	5.3		14.1
O.P.	640	5.7	6.4		12.1
D.R.	6550	39.6	8.4	.3	48.3
O.R.	8650	22.7	31.7	.8	55.2
Str.	2411	174.8	3.4	38.9	217.1
Brush	1205	147.7	21.4		169.1
Rock	45 1/4	51.1		426.0	477.1
Total	38896 1/4	46.0	17.0	3.2	66.2

By referring to Tables Nos. 27 and 28 it is evident that the Ribes species having the largest average number per acre, also grows on the highest percentage of acres producing more than ten Ribes per acre.

Analysis of Costs and Time of Performing Control Reconnaissance
on Coeur d'Alene and St. Joe National Forests, Combined
June 27, 1926 to September 15, 1926

Table No. 29 shows the items making up the total cost of control reconnaissance on the two national forests on which work was performed in 1926.

Table No. 29

Costs of Control Reconnaissance, Federal Lands, 1926 on
Coeur d'Alene National Forest and St. Joe National Forests, Idaho
June 27, 1926 to September 15, 1926

Area	Salaries	Travel			Subsistence	Equipment		Grand Total
		Auto	Other	Meals		Charge	Freight	
C.D.A.	1505.61	149.33	12.00	15.40	401.91	55.34	6.22	2145.81
St.Joe	265.97	65.96		4.00	102.57	14.00		452.50
Totals	1771.58	215.29	12.00	19.40	504.48	69.34	6.22	2598.31

The discussion of the composition of these items has been given in this report and will not be repeated here.

Table No. 30 shows how the total time was spent in performing control reconnaissance on the two national forests June 27 to September 15, 1926.

Table No. 30

Analysis of Time Spent in Performing Control Reconnaissance on the Coeur d'Alene and St. Joe National Forests Combined June 27, 1926 to September 15, 1926.

Type of Work	Actual Time			
	Man Days		Percentage	
Intensive Reconnaissance	107 1/2		23.71+	
Typing Only	104 1/2		23.04	
Total Data Taking Work		212		46.75
Office	94 1/2		20.84-	
Camp, packing	37		8.16	
Travel	46		10.14	
Rain, no work	5 1/2		1.21	
Sundays, Holidays	42 1/2		9.37	
Supervision	16		3.53	
Total, Other Activities		241 1/2		53.25
Grand Total	453 1/2	453 1/2	100	100

The total time charged to time spent in taking data is as follows: 230 man days or 50.7 per cent of the total time is charged to intensive reconnaissance; and 223 1/2 man days, or 49.3 per cent of the total time is charged to extensive reconnaissance. The derivation of these figures is shown in detail in the discussion of analysis of time on the Coeur d'Alene National Forest.

The following cost items are based on total time and expense in performing control reconnaissance on the Coeur d'Alene and St. Joe National Forests combined, 1926.

Cost Charged to Intensive Reconnaissance,

$$50.7\ \% \times \$2598.31 = \$\ 1317.34$$

Cost Charged to Typing Only,

$$49.3\ \% \times \$2598.31 = \$\ 1280.97$$

Cost per Section Intensive Reconnaissance,

$$\frac{\text{Cost} \qquad \$1317.34}{\text{Sections} \qquad 110} = \$ \quad 11.98$$

Cost per Section Typed Only,

$$\frac{\text{Cost} \qquad \$1280.97}{\text{Sections} \qquad 364} = \$ \quad 3.52$$

Cost per Section, All Sections Worked,

$$\frac{\text{Cost} \qquad \$2598.31}{\text{Sections} \qquad 474} = \$ \quad 5.48$$

Cost per Acre Intensive Reconnaissance,

$$\frac{\text{Cost} \qquad \$1317.34}{\text{Acres} \qquad 69,130} = \$ \quad .0190$$

Cost per Acre, Typed Only,

$$\frac{\text{Cost} \qquad \$1280.97}{\text{Acres} \qquad 220,466} = \$ \quad .0058$$

Cost per Acre, All Acres Worked,

$$\frac{\text{Cost} \qquad \$2598.31}{\text{Acres} \qquad 289,596} = \$ \quad .0089$$

Ave. Cost per Man Day,

$$\frac{\text{Cost} \qquad 2598.31}{\text{Man Days} \qquad 453.5} = \$ \quad 5.73$$

Ave. No. Days per Section Intensively Reconnaissanced,

$$\frac{\text{Man Days} \qquad 230}{\text{Sections} \qquad 110} = \quad 2.09 \text{ days}$$

Ave. No. Days per Section Typed Only,

$$\frac{\text{Man Days}}{\text{Sections}} \quad \frac{223.5}{364} = .62 \text{ days}$$

Ave. No. Days per Section, All Sections Worked equals:

$$\frac{\text{Man Days}}{\text{Sections}} \quad \frac{453.5}{553} = .95 \text{ days}$$

E. Project Supervisor's Trip on St. Joe National Forest

From August 17 to August 25, 1926 the Supervisor made an extensive trip over the Palouse Division and the Main Division of the St. Joe for the purpose of familiarizing himself with conditions, meeting the forest officers, and planning out further control reconnaissance on this forest.

As a result of this trip on the Palouse Division, two weeks control reconnaissance was performed in the first half of September, a discussion of which has been given in this report.

A four day hiking trip was made in the Main Division. The route taken was as follows: starting at Avery he went up the St. Joe River to St. Joe quartz mine, thence southwest on the ridge trail to Bear Skull, thence to Twin Creek Ranger Station on the north fork of the Little Clearwater River, thence north to Avery via the main trail down Kelley Creek.

Conditions were found to be excellent for extensive typing, since the topography is rough and definite, and since many of the trails run along ridges.

Good stands of white pine of different age classes are found here.

Many Ribes were found, namely: R. lacustre, R. viscosissimum, G. inermis, G. irrigua and R. petiolare. The latter was found abundantly on the north fork of the Little Clearwater River in shade and among rocks along streams.

As a result of this trip and a conference with Forest Supervisor Phillips, tentative plans were made to perform control reconnaissance on the Main Division at some future time by putting a crew of two or three men in each of the four working circles of the forest, and having each crew work completely the working circle to which it was assigned.

Table No. 31 shows the costs of this trip.

Table No. 31

Costs of Supervisor's Trip over St. Joe National Forest, 1926, for Purposes of Planning Future Reconn. Work
July 17 to August 25, 1926

Salary	Travel			Subsistence			Grand Total
	Auto	Other	Meals	Meals	Rate per Meal	Total Cost	
71.01	29.26	7.37	3.00	8	.403	3.25	
				Meals and Lodging paid for as taken		15.00	
71.01	29.26	7.37	3.00			18.25	128.89

Classification of Time

Looking over Areas . . . . 6 days

Travel . . . . 2 days

Office . . . . 1 day

Total 9 days

$\frac{\text{Cost of Trip}}{\text{Man Days}}$ equals $\frac{\$128.89}{9}$ equals \$14.32 per man day cost.

F. Summary of All Costs of Control Reconnaissance on Federal Lands
June 21 to September 15, 1926

Table No. 32 gives the items making up the total cost of control reconnaissance on Federal lands, June 21 to September 15, 1926.

Table No. 32

Summary of All Cost of Reconnaissance
Federal Lands, 1926

Project Division	Days	Salaries	Travel Auto	Travel Other	Travel Meals	Subsistence	Equipment Charge	Equipment Frt.	Total
Training	58 1/2	223.90	27.93	11.00	12.85	30.71			306.39
C.D.A.	386 1/2	1505.61	149.33	12.00	15.40	401.91	55.34	6.22	2145.81
St. Joe	67	265.97	65.96		4.00	102.57	14.00		452.50
Supervisors Trip on St. Joe	9	71.01	29.26	7.37	3.00	18.25			128.89
Totals	521	2066.49	272.48	30.37	35.25	553.44	69.34	6.22	3033.59
Percentages		68.1	11.2			18.2	2.5		

IV. Permanent Forms for Filing Control Reconnaissance Information

In the past there has been no uniformity among control reconnaissance project leaders working on Federal and private lands in putting their results into permanent uniform forms.

As a result of a conference of such leaders in October, 1926, a uniform system was agreed upon. It was agreed to record intensive data on sections on a condensed summary sheet similar to the field summary sheet, and to record all mapping done in accordance with directions for recording, which follows, quoted in full:

Permanent Maps of Reconnaissance Work

Intensive Reconnaissance

"I. Type Designations:

"Designations should agree with those used in mapping types in the field. These should consist of (1) the abbreviated form of the eradication type (2) the timber type with white pine stated first and the associated species in order of their predominance, and (3) age class of the stand. Type designations shall be written with Higgins Carmine waterproof ink.

"II. Type Lines:

"Type lines shall be dotted lines made with Higgins Carmine waterproof ink.

"III. Color Legend for Eradication Types:

"The following Dixon colored crayons shall be used for coloring eradication types:

Type	Color	Dixons Best No.
1. D.M.	Yellow	353
2. O.M.	Green	354
3. D.P.	Orange	324
4. O.P.	Blue	350
5. D.R.	Brown	335
6. O.R.	Violet	323
7. St.	Red	321 1/2

"Meadows, rock type, burns not reproducing will be designated but not colored.

"These colors should be applied lightly and evenly and then dry rubbed with clean cheese cloth wrapped over a finger or pencil.

"IV. Cultural Features:

"Streams shall be inked with Higgins Indigo blue waterproof ink.

"Roads, trails, railroads, telephone lines, buildings, names of streams and other cultural features shall be shown with Higgins waterproof black ink.

"Type lines, type designations, streams and cutural features shall all be entered on the map before the eradication type colors are applied.

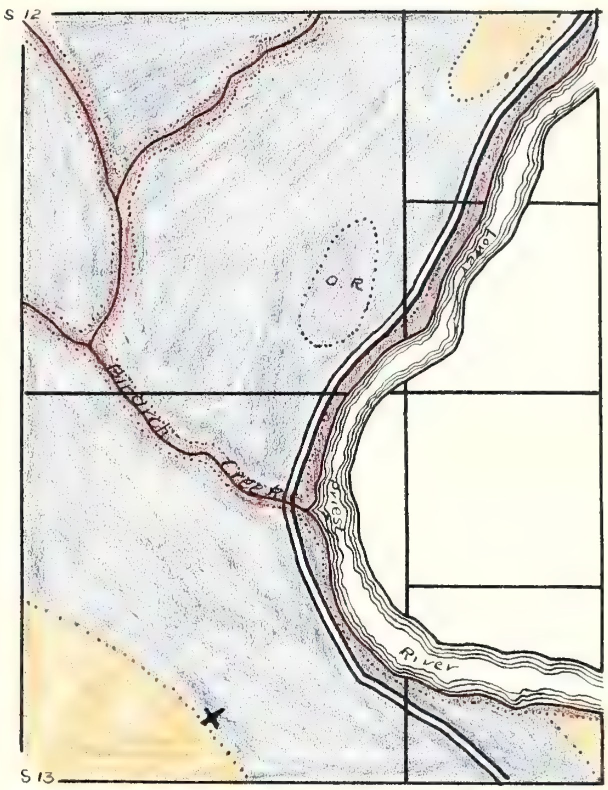
Extensive Reconnaissance

"Type lines, type designations, and cultural features shall be shown exactly as in mapping intensive work. Colors for eradication types shall be the same as in intensive but the colors shall be in horizontal cross hachures instead of in solid colors."

H. N. Putnam,
Assistant Pathologist.
J. L. Bedwell,
Assistant Pathologist.

Spokane, Wash.
October 27, 1926.

Illustration of eradication area at junction of Binarch Creek and Lower Priest River. Note how perfectly typing is done by field crews by referring to picture of same area taken from point near spot marked X. Picture shown on following page, W216.



Type Legend.

Stream.

Open Reproduction.

Dense Pole.

Open Pole.

W216.
Part of area on which eradication was done in 1926. The open spot to the left of Priest River is a small burn, Open Reproduction type, Ribes 190 per acre, surrounded by Open Pole type, Ribes 4 per acre.

W215.
Open Pole eradication type, Binarch Creek, on area in which eradication was conducted in 1926, Ribes 4 per acre.

EXPERIMENTAL RIBES ERADICATION IN IDAHO

by

C. C. Strong,
Junior Forester.

* * *

For several reasons, the details of which will become obvious throughout the progress of this report, the 1926 field operation in eradication of the wild hosts of blister rust underwent many important changes in organization, scope, and proportion. It was felt that the proposed increased size of operation and the necessity for hastening southward into the more typical white pine areas were logical reasons for abandoning the rather broken and inaccessible areas north of Priest Lake. The plan was to operate in a more typical white pine area, almost unbroken in extent, with unlimited areas for expansion and many variations with respect to age class, aspect, moisture conditions, and species of Ribes present.

Preliminary Extensive Scouting

Several scouting trips were taken during the fall and spring months in an effort to locate an area which would offer the above conditions. The first area scouted was that on which a part of the Federal reconnaissance crew worked in the summer of 1925. There was sufficient white pine of all age classes and conditions were typical of those in normal white pine areas where management is attempted to some extent. However, the area was broken by rather numerous and extensive private holdings and much of the timber on Federal lands had been sold and was being logged. Eradication under these conditions would have been difficult, so it was decided to forego such work until crews were better organized and the cutover areas were being restocked by natural seeding.

Another area on which the balance of the Federal reconnaissance crew had worked during the same season, 1925, was on the Coeur d'Alene National Forest. Partly for similar reasons and partly for the fact that this area was rather limited in extent and far from the original eradication area of the past three years, it was decided to search further and go into regions where no reconnaissance had been done.

Location of Area

Further scouting resulted in the location of an area which seemed to be suitable for the 1926 experimental work. This area was gone over extensively in the early spring. The spring scouting confirmed the belief that the area was suitable and plans were made accordingly. The area is located in Townships 59 and 60 N., Ranges 4 and 5 W. of the Boise Principal Meridian and immediately west of the lower end of Lower Priest Lake on the Kaniksu National Forest, extending from the Nordman highway to the state line between Idaho and Washington. More specifically, it includes the two drainages of Binarch and Lamb creeks.

So far as could be ascertained in advance, conditions with respect to eradication were fairly uniform over the entire acreage. This condition was necessary as will be seen later for the type of experiments to be carried on.

Purpose and Projects

The purpose of the work was principally a further experiment in devising and perfecting better and more economical means of eradicating the wild hosts of blister rust. It was planned to carry on experiments as follows:

1. Most practical and economical size of camp. It had been found that such an experiment was needed to reach a decision as to the proper size of unit, a mean between two extremes, a large cumbersome camp with a small meal cost and a small mobile camp with higher meal costs.

2. Development of a scouting organization which would be adaptable to all conditions. Past experience confirmed the belief that ordinary eradication crew men could never eradicate areas of few Ribes as cheaply and efficiently as more experienced men employed as scouts.

3. Use of various tools as an aid to hand-pulling, where needed.

4. Best organization of men on types requiring intensive formation.

5. Further experiments on methods of laying trail. The possibility of using string was to be tried by the methods crew and, if found successful, to be further tried by eradication crews.

6. Training of additional personnel for future work.

Description of Area

The Lamb and Binarch creek areas are actually from 27 to 40 miles from Priest River, Idaho. The area is easily accessible by means of good roads and trails. Camps could be established on roads for a large part of the area. The two streams run in a general east-southeast direction, both of them flowing into lower Priest River a short distance from the lake outlet. White pine exists on all parts of the area in mixtures varying from pure stand to a mixture containing very little white pine.

In age, the white pine present can be classed from seedlings to mature trees. There are sufficient acres of all recognized age classes to give very accurate figures on cost of eradicating these stands. However, dense and open pole stands constitute a large part of the existing stands on the area in question.

There is a very marked difference in composition of stand and number and distribution of Ribes on the various exposures. Generally heavy growth of timber and Ribes are found on the north and east slopes while the south and west slopes are much drier, supporting excellent stands of white pine but few Ribes except along the streams. Moisture is probably the controlling factor here. Snows lay on the north and east slopes long after that on the south and west slopes had melted away. In many cases on the spring scouting trip steep south slopes were powdery dry while north slopes had from one to three feet of snow.

Crew Methods

During the early part of the season an eight-man crew was used. This crew consisted of six men in line and a foreman and assistant foreman checking behind to generally supervise the crew. While this crew formation was adapted to areas of many Ribes, it soon became evident that it was too cumbersome for conditions on the particular area being worked. From that time on throughout the season the practice was to use a smaller and more flexible crew varying in size to meet the varying conditions. Much better success was had by the latter method.

Scouting

Two general scouting methods were employed, the details and results of which are described by F. A. Patty, who was placed in charge of this special work, in a report immediately following this one.

Fire Cooperation

The total amount of work performed was far less than that which was expected. This was largely accounted for by the serious fire situation which developed on July 12 and was not controlled until rains came on August 17. The effect of this on the total amount of work done as compared with what was expected is evident upon an analysis of the data below.

Number of man days spent actually eradicating Ribes (Including Sundays worked)		$1742\frac{3}{4}$
Number of man days spent actually fighting fire (Excluding Sundays)		1856
Percent of total on eradication	48.4	
Percent of total on fire fighting	51.6	

Over one-half of the season was thus spent on work other than eradication. This does not tell of the total loss, however. The days spent on fire fighting were days on which the best work of the season would have been accomplished. The weather was perfect for eradication. It is hard to estimate the effect of this loss of time but it is certain to have been great. In addition, many of the employees quit after it

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became apparent that the fire season would last indefinitely. Another loss in man days for the balance of the season was thus occasioned.

The fire season was terminated by the coming of rain. After rains began the loss of time because of them from that period to the end of the season, near the middle of September, totalled nearly one half of the possible working days. For the reasons stated it is not surprising that the amount of work actually completed fell far below that which was expected to be done.

Some difficulty was experienced with the personnel due to the fire work, where it was necessary to spend from 12 to 16 hours per day at the hardest kind of work and, in some cases, even more hours were worked. In spite of these hardships most of the men stayed through and finished the season on eradication. This spirit was greatly appreciated and in all cases men were given the best possible treatment under the circumstances. The good work of most of the employees of this office on fire duty has brought forth letters of commendation from Mr. Morrell, District Forester of District 1, with headquarters at Missoula, Montana, and Mr. Whitham, Forest Supervisor of the Kaniksu National Forest. The following is an extract from Mr. Morrell's letter:

"I had intended to write you long before this a word of appreciation for the work of your crews on fire control during the season past. From everywhere amongst our men I heard the information volunteered that the blister rust men did splendid work and saved the day on a good many occasions. I think I have never heard more sincere and vigorous appreciation expressed regarding any cooperative agency. I wanted to write this to you sooner with the idea that you might want to pass it along to the boys who were on the crews during the season, but the rush of other work prevented my being in the office and attending to it before your crews were disbanded. I have a very earnest desire to see the expression reach the men who did the work and should you still find it possible to convey it to them I would appreciate it very much indeed."

Mr. Whitham wrote as follows:

"As Supervisor of the Kaniksu National Forest, I wish to express my appreciation of the excellent spirit of co-operation and unselfish service which characterized your work on the forest this season in assisting us in the suppression of forest fires. It was a piece of work honestly and efficiently done.

"I certainly have a lot of admiration for the spirit and grit of the men who bore the heat and burden of the long fight. It was a tough job this season for all of those engaged in the firefighting organization. I almost wonder how some of the men stood up under the strain of fatigue and responsibility that was placed on them, and I only wish there were some more fitting way whereby the Government could better reward public service of so fine a quality.

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"I know it was discouraging co-operating the way the Blister Rust boys did, and after having put all that they had in brains, energy and physical endurance, to see such losses as occurred on the Kaniksu last summer, but there is a lot of satisfaction in knowing that to a man the Blister Rust and our regular protective organization did the very best that they knew how to do and put all the determination and fighting spirit they had into their job. For anyone outside the Service, it was difficult to tell who were permanent men in the Service and who were co-operating agents, or who were members of the temporary protective organization. It is the spirit that will win and will assure us that future crises will be adequately met.

"I am very glad indeed of the privilege of writing you this brief letter of appreciation of your services which I know were given at a considerable sacrifice of your own work. I hope that it will be accepted as coming not only from me alone, but as an official recognition throughout the Forest Service of what you and the Blister Rust boys under your leadership have done to help out in a most serious crisis."

Results of Work

Considering all the adverse factors mentioned previously, the amount of work done was gratifying. The total results of the summer's work is shown in the following tabulation. The types are defined in the reconnaissance report.

Table No. I.

Summary of Eradication by Type

Type	Ribes				Time				Acres	Ribes per Acre
	R. lac.	R. visc.	G. iner.	Total Ribes	Laborer Days	Ass't Foreman Days	Foreman Days	Scout Days		
D.M.	1040	1		1041	14	1.25	3.13	4	465	2.2
D.P.	10379	799	449	11627	87.33	7.25	19.62	15.25	1612	7.2
D.R.	14294	1075	232	15651	121.75	19.00	27.88	3.33	940.50	16.6
O.M.	5571	102	316	5989	41.87	8.88	7.81	0.25	573	10.5
O.P.	31071	86278	3031	120380	378.06	77.31	57.875	19.62	4300.87	280.0
O.R.	5149	1266	164	6579	44.00	6.87	9.56	1.00	472	14.0
Stream	133991	4467	79537	217995	566.94	78.69	102.50	23.625	501.63	434.2
Total	201495	93938	83779	379262	1254.00	199.25	222.375	67.125	8865.00	42.8

The above table is a summary of the work of the three camps. Conditions on the areas worked by the different camps varied greatly. The extent of the variations became evident upon an analysis of the following tables. These tables show the progress for each of the camps separately.

Table No. II.

Camp No. 1.

Type	Ribes				Time				Acres	Ribes per Acre
	R. lac.	R. vis.	G. iner.	Total Ribes	Laborer Days	Ass't Foreman Days	Foreman Days	Scout Days		
D.M.	1000	1		1001	14.00	1.25	3.13		255	4.0
D.P.	3966	300		4266	67.63	5.00	14.00	7	1115 .00	3.9
D.R.	3203	172		3375	71.37	12.00	15.12	3.25	807.50	4.2
O.M.	1656	13	83	1752	28.50	6.75	6.13	0.25	390.00	4.5
O.P.	6752	346		7098	40.88	7.33	8.62	2.50	809.00	3.7
O.R.	3534	298		3832	17.87	3.75	4.50	1.00	386.00	10.0
Str.	77192	1925	46532	125649	316.50	40.62	59.00	18.50	239.50	524.0
Total	97303	3055	46615	146973	556.75	76.75	110.50	32.50	4002.00	36.8

Table No. III.

Camp. No.2.

Type	Ribes				Time				Acres	Ribes per Acre
	R. lac.	R. visc.	G. iner.	Total Ribes	Laborer Days	Ass't Foreman Days	Foreman Days	Scout Days		
D.M.										
D.P.	2741			2741	7.63		2.37		40.00	68.5
D.R.	10972	903	282	12157	50.00	7.00	6.50		128.00	94.9
O.M.	3915	89	233	4237	13.37	2,13	1.69		183.00	23.1
O.P.	8551	6829		15380	112.94	17.06	22.75	0.375	2496.38	6.1
O.R.	1169	966		2135	21.87	3.12	3.44		61.00	33.6
Str.	51252	2515	5878	59645	166.94	24.69	33.50		191.62	310.7
Total	78600	11302	6393	96295	372.75	54.00	70.25	0.375	3100.00	31.1

Table No. IV.

Camp No. 3.

Type	Ribes				Time				Acres	Ribes per Acre
	R. lac.	R. visc.	G. iner.	Total Ribes	Laborer Days	Ass't Foreman Days	Foreman Days	Scout Days		
D.M.	40			40				4.00	210.00	.2
D.P.	3672	499	449	4620	12.13	2.25	3.25	8.25	457.00	10.1
D.R.	119			119	0.37		0.25	0.12	5.00	23.8
O.M.										
O.P.	15768	79103	3031	97902	224.25	52.88	26.50	16.75	995.50	98.3
O.R.	446	2	164	612	4.25		1.625		25.00	24.4
Str.	5547	27	27127	32701	83.50	13.37	10.00	5.13	70.50	467.1
Total	25592	79631	30771	135994	324.50	63.50	41.625	34.25	1763.00	77.1

Analysis of Costs

While these tables show the actual progress they do not constitute bases for analyzing the efficiency of the various units. This information will be gained through an analysis of the cost tables which follow. The first one, Table V, is a general summary of the costs per acre for the entire operation.

A further division was made as shown in tables VI, VII, and VIII, showing the same items of cost in the three camps.

Table No. V.

Cost Analysis

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.	2.2			2.2	465.0	4.0	3.125	1.25	14.0	$ 148.06	$ .32	$ .145
D.P.	6.4	.5	.3	7.2	1612.0	15.25	19.625	7.25	87.375	846.50	.53	.074
D.R.	15.2	1.1	.3	16.6	940.5	3.375	21.375	19.00	121.75	1063.08	1.13	.068
O.M.	9.7	.2	.5	10.4	573.0	.25	7.8125	8.875	44.875	394.67	.69	.067
O.P.	7.2	20.1	.7	28.0	4300.9	19.625	57.375	77.3125	378.0625	3423.20	.80	.029
O.R.	10.9	2.7	.3	13.9	472.0	1.0	9.5625	6.875	44.0	393.66	.83	.060
Str.	267.1	8.9	158.6	434.6	501.6	23.625	102.5	78.6875	566.9375	4951.84	9.87	.023
Totals & Ave.	22.7	10.6	9.5	42.8	8865.0	67.125	222.375	199.25	1254	$11202.10	$1.26	$ .029

Table No. VI.

Cost Analysis
Camp No. 1

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.	4.0			4.0	255		3.12	1.25	14.00	$ 106.60	$ .418	$ .106
D.P.	3.6	.3		3.9	1115	7.00	14.00	5.00	67.63	551.94	.495	.139
D.R.	4.0	.2		4.2	307.50	3.25	15.13	12.00	71.37	596.00	.738	.143
O.M.	4.3			4.3	390.00	0.25	6.12	6.75	28.50	242.24	.621	.138
O.P.	8.3	.4		8.7	809	2.50	8.63	7.38	40.87	348.05	.430	.049
O.R.	9.2	.8		10.0	386	1.00	4.50	3.75	17.38	158.61	.411	.041
Str.	322.0	8.0	194	524.0	239.50	18.50	59.00	40.62	316.50	2543.68	10.575	.020
Totals & Ave.	24.3	.8	11.7	36.8	4002.00	32.50	110.50	76.75	556.75	$4547.12	$ 1.136	.031

Table No. VII.

Cost Analysis
Camp No. 2.

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.												
D.P.	68.5			68.5	40.00		2.37		7.62	$ 64.95	$ 1.624	$.024
D.R.	85.7	7.0	2.2	94.9	128.00		6.50	7.00	50.00	410.40	3.206	.034
O.M.	21.4	.4	1.3	23.1	183.00		1.69	2.13	13.37	111.09	.607	.026
O.P.	3.4	2.7		6.1	2496.37	0.375	22.75	17.06	112.94	993.03	.398	.065
O.R.	17.8		15.8	33.6	61.00		3.44	3.12	21.88	184.00	3.016	.086
Str.	267.00	13.1	30.6	310.7	191.63		33.50	24.69	166.94	1459.15	7.652	.024
Totals & Avgs	25.3	3.7	2.1	31.1	3100.00	0.375	70.25	54.00	372.75	3222.62	1.04	.033

Table No. VIII.

Cost Analysis
Camp No. 3.

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't. Foreman Days	Laborer Days			
D.M.	.2			.2	210.00	4.00				$ 34.08	$ .162	$ .775
D.P.	8.0	1.1	1.0	10.1	457.00	8.25	3.25	2.25	12.12	198.53	.435	.043
D.R.	23.8			23.8	5.00	0.12	0.25		0.38	5.62	1.124	.047
O.M.												
O.F.	15.8	79.5	3.0	98.3	995.50	16.75	26.50	52.87	224.25	2325.70	2.347	.024
O.R.	17.8		6.6	24.4	25.00		1.625		4.25	42.38	1.695	.[illegible]69
Str.	79.2	.4	387.5	467.1	70.50	5.13	10.00	13.38	83.50	811.28	11.590	.025
Totals & Avgs	14.5	45.1	17.5	77.1	1763.00	34.25	41.625	68.50	324.50	3417.59	1.933	.025

Division into Periods

Training:

The 1926 eradication season logically falls into three periods. The training period covers approximately one week's time in each camp. During this period the new men are given special instruction relative to species of Ribes and the crew methods to be used. Work accomplished during this period was inefficient and often required working over later on when crew work was much more efficient.

Pre-Fire and Post-Fire Periods:

The second period was that immediately following the training period and ending at the beginning of the fire season. The third one, the period following the fire season and closing with the end of the eradication season was one in which the efficiency of men was satisfactorily high but broken by frequent rains and unfavorable working conditions. The work done in this period was loaded with heavy overhead costs due to the lost time of monthly men and the cost of subsisting all men while rain made work impossible. For the above reasons it has been seen fit to divide the work done into that done in the three periods. The following tables show the important results by periods for each camp.

Table No. IX.

Training Period
All Camps

Type	Ribes per acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.												
D.P.	4.5		.1	4.6	189.00	4.00	7.00		28.50	$ 257.25	$ 1.36	$0.29
D.R.	4.5			4.5	76.00	1.50	4.00		17.50	148.60	1.95	0.42
O.M.	6.9			6.9	6.00		0.25		1.00	7.97	1.33	0.19
O.P.	8.2	42.9		51.1	126.50		4.00	6.50	43.25	341.52	2.72	0.05
O.R.	10.7	0.2		10.9	26.00		0.88	0.87	6.125	50.14	1.93	0.18
Str.	116.9	0.1	381.8	498.8	53.375	9.50	21.37	7.63	113.00	977.32	18.31	0.04
Totals & Avgs	18.3	11.5	42.9	72.7	476.875	15.00	37.50	15.00	209.375	$1783.30	$ 3.74	$0.05

Table. No. X.

Pre-Fire Period
All Camps

Type	Ribes per Acre: R. lacustre	R. visco.	G. inermis	Total	Acreage	Time: Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days	Total Cost	Cost per Acre	Cost per Ribes Pulled
D.M.	3.1			3.1	227.00		2.63	1.25	12.00	$ 101.32	$ .45	.12
D.P.	6.0	.3	.8	7.1	508.00	0.50	5.50	4.00	25.12	225.00	.44	.063
D.R.	21.6	2.3		23.9	446.50	0.75	13.25	11.62	69.88	610.21	1.37	.058
O.M.	10.0	0.4		10.4	292.00	0.25	3.44	3.00	18.00	157.57	.54	.050
O.P.	5.9	11.2	.5	17.6	2420.37	2.00	29.56	27.00	171.06	1466.69	.61	.034
O.R.	25.2	8.9		34.1	140.00	1.00	5.81	4.50	28.125	253.09	1.81	.053
Str.	416.0	3.0	175.0	594.0	210.88	7.00	51.06	37.13	295.94	2501.74	11.86	.020
Totals & Avgs	28.7	7.1	9.1	44.9	4244.75	11.50	111.25	88.50	620.125	$5315.62	$ 1.25	$.028

Table. No. XI.

Post-Fire Period
All Camps

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.	0.7			0.7	238.00	4.00	.50		2.00	$ 46.75	$ .196	.27
D.P.	7.1	0.7		7.8	915.00	10.75	7.13	3.25	33.75	364.26	.40	.051
D.R.	10.4	0.1	0.7	11.2	418.00	1.13	4.625	7.38	34.38	304.15	.75	.066
O.M.	9.5		1.2	10.7	275.00		4.12	5.87	22.87	209.94	.76	.072
O.P.	9.1	30.6	1.0	40.7	1754.00	17.625	24.31	42.81	163.75	1615.00	.92	.023
O.R.	4.4		0.5	4.9	306.00		2.88	1.50	9.75	90.45	.30	.060
Str.	168.9	16.1	93.7	278.7	237.375	7.12	30.06	33.94	158.00	1472.27	5.19	.022
Totals &Avgs	17.9	14.0	6.0	37.9	4143.375	40.625	73.625	95.75	424.50	4102.32	.99	.027

Table. No. XII.

Training Period.
Camp. No.1.

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.										$	$	$
D.P.	1.8			1.8	185	4.00	6.00		25.50	211.06	1.141	.61
D.R.	4.5	.2		4.7	76	1.50	4.00		17.50	135.26	1.78	.386
O.M.	6.8			6.8	6		0.25		1.0	7.25	1.208	.178
O.P.												
O.R.												
Str.	93.7		384.1	477.8	31	9.50	15.25		58.00	492.73	15.895	.033
Totals & Avgs	12.2		40.0	52.2	298	15.00	25.50		102.00	$ 846.30	$ 2.87	$ .054

Table No. XIII.

Pre-Fire Period.
Camp No. 1.

Type	Ribes per Acre: R. lacustre	Ribes per Acre: R. visco.	Ribes per Acre: G. inermis	Ribes per Acre: Total	Acreage	Time: Scout Days	Time: Foreman Days	Time: Ass't Foreman Days	Time: Laborer Days	Total Cost	Cost per Acre	Cost per Ribes Pulled
D.M.	3.7			3.7	227		2.62	1.25	12.00	$ 92.10	$ .406	$ .106
D.P.	1.1			1.1	493	.50	3.63	2.12	17.12	136.27	.276	.259
D.R.	5.7	.3		6.0	331.50	.75	6.75	5.13	28.88	242.16	.732	.120
O.M.	6.5	.1		6.6	132	.25	2.38	2.25	11.25	93.98	.712	.107
O.P.	6.3	.6		6.9	749	2.00	8.12	5.37	35.38	298.26	.398	.063
O.R.	25.5	2.8		28.3	105	1.00	3.25	2.25	12.37	111.12	1.058	.038
Str.	426.5	.3	127.7	554.5	154.50	7.00	33.50	26.13	211.00	1616.44	10.50	.019
Totals & Avgs	35.2	.4	9.0	44.6	2192.00	11.50	60.25	44.50	328.00	$2592.70	1.183	.027

Table No. XIV.

Post-Fire Period
Camp No. 1.

Type	Ribes per Acre: R. lacustre	Ribes per Acre: R. visco.	Ribes per Acre: G. inermis	Ribes per Acre: Total	Acreage	Time: Scout Days	Time: Foreman Days	Time: Ass't Foreman Days	Time: Laborer Days	Total Cost	Cost per Acre	Cost per Ribes Pulled
D.M.	4.8			4.8	28		.50		2.00	$ 14.50	$ .518	.109
D.P.	7.1	.7		7.8	437	2.50	4.38	2.88	25.00	204.60	.469	.060
D.R.	2.4	.4		2.8	400	1.00	4.37	6.37	25.00	217.60	.544	.216
O.M.	3.0		.4	3.4	252		3.50	4.50	16.25	141.01	.559	.165
O.P.	39.0	.2		39.2	60	0.50	0.50	2.00	5.50	49.90	.832	.021
O.R.	3.2			3.2	281		1.25	1.50	5.50	46.99	.167	.052
Str.	160.0	34.7	274.4	469.1	54	2.00	10.25	14.50	47.50	434.51	8.049	.018
Totals & Averages	11.1	1.5	9.2	21.8	1512	6.00	24.75	32.25	126.75	$1110.12	$ .734	$ .033

Table No. XV.

Training Period
Camp No. 2.

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.												
D.F.												
D.R.												
O.M.												
O.P.	24.8	5.9		30.7	34.00		2.00	2.00	12.25	$ 105.20	$3.10	.1004
O.R.	10.7	.2		10.9	26.00		0.87	0.87	6.125	50.83	1.955	.180
Str.	281.0	.4	.1	281.5	9.875		3.13	3.13	18.00	157.07	15.91	.056
Totals & Averages	56.1	3.0		59.1	69.875		6.00	6.00	36.375	313.10	4.48	.075

Table No. XVI.

Pre-Fire Period
Camp No. 2.

	Ribes per Acre					Time						
Type	R. lacustre	R. visco.	G. inermis	Total	Acreage	Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days	Total Cost	Cost per Acre	Cost per Ribes Pulled
D.M.												
D.P.												
D.R.	67.1	7.8		74.9	115.0		6.50	6.50	41.0	$ 349.50	$ 3.038	.046
O.M.	11.6		1.5	13.1	160.0		1.07	0.75	6.75	55.37	0.346	.026
O.P.	3.8	1.8		5.6	1560.38		12.06	10.25	66.435	576.87	0.37	.066
O.R.	25.4	27.5		52.9	35.0		2.56	2.25	15.75	132.68	3.791	.072
Str.	540.6	13.6	15.2	569.4	34.37		11.81	5.25	51.19	442.57	12.88	.023
Totals & Averages	18.3	2.8	0.3	21.4	1904.75		34.0	25.0	181.125	1556.99	0.817	.038

Table No. XVII.

Post-Fire Period
Camp No. 2.

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.												
D.P.	68.5			68.5	40		2.37		7.63	$ 64.95	$1.624	$.024
D.R.	250.4		21.5	271.9	13			0.50	9.00	60.90	4.685	.017
O.M.	81.0		10.0	91.0	23		0.63	1.38	6.62	55.72	2.420	.022
O.P.	1.9	4.3		6.2	902	0.375	8.69	4.81	34.25	312.96	0.347	.055
O.R.												
Str.	204.5	13.3	36.4	254.2	147.375		18.56	16.31	97.75	859.49	5.832	.023
Totals & Averages	35.3	5.2	5.2	45.7	1125.375	0.375	30.25	23.0	155.25	$1354.02	$1.20	$.026

Table No. XVIII.

Training Period.
Camp No. 3.

	Ribes per Acre					Time						
Type	R. lacustre	R. visco.	G. inermis	Total	Acreage	Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days	Total Cost	Cost per Acre	Cost per Ribes Pulled
D.M.												
D.P.	152.0	.5	6.7	159.2	4.0		1		3	$ 28.88	$ 7.22	$ .054
D.R.												
O.M.												
O.P.	2.1	56.9		59.0	92.5		2	4.50	31	268.70	2.90	.049
O.R.												
Str.	38.3		682.2	720.5	12.5		3	4.50	37	318.94	25.52	.035
Totals & Averages	10.8	48.3	78.5	137.6	109.0		6	9.0	71	$616.52	$ 5.65	$ .041

Table No. XIX.

Pre-Fire Period
Camp No. 3.

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.												
D.P.	166.5	11.0	28.1	205.6	15		1.88	1.88	8.00	$ 84.79	$ 6.32	$ .028
D.R.												
O.M.												
O.P.	34.6	217.3	11.3	263.2	111		9.37	11.37	69.25	646.84	5.83	.022
O.R.												
Str.	169.0	.6	753.4	223.0	22		5.75	5.75	33.75	325.63	14.80	.011
Totals & Averages	67.8	164.2	123.2	355.2	148		17.0	19.0	111.0	$1057.25	$ 7.14	.020

Table No. XX.

Post-Fire Period.
Camp No. 3.

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.	.19			.19	210	4.00				$ 34.08	$ .162	$ .852
D.P.	1.55	.75		2.30	438	8.25	.63	.38	1.12	83.68	.191	.083
D.R.	23.8			23.8	5	.13	.25		.38	6.62	1.324	.055
O.M.												
O.P.	14.82	62.9	2.26	79.98	792	16.75	15.12	37.0	124	$1409.93	1.780	.022
O.R.	17.84	.10	6.56	24.50	25		1.625		4.25	42.48	1.700	.070
Str.	37.53	.30	56.25	94.08	36	5.12	1.25	3.12	12.75	166.71	4.631	.049
Totals & Averages	9.6	33.2	2.6	45.4	1506	34.25	18.625	40.50	142.50	$1743.55	$1.16	$ .025

Table No. XXI.

Post-Fire Period.
Scout Work

Type	Ribes per Acre				Acreage	Time				Total Cost	Cost per Acre	Cost per Ribes Pulled
	R. lacustre	R. visco.	G. inermis	Total		Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days			
D.M.	0.2			0.2	210	4.0				$ 34.03	$ 0.16	$ .352
D.P.	1.1	0.3		1.4	432	8.25				70.29	0.16	.116
D.R.	23.8			23.8	5	0.12	0.25		0.37	5.62	1.12	.047
O.M.												
O.P.	7.3	29.3		36.6	219	16.75	2.50		5.75	203.45	0.93	.025
O.R.												
Str.	37.7		8.5	46.2	20	5.13	0.25		1.38	55.33	2.77	.060
Totals & Averages	3.4	7.4	0.2	11.0	886	34.25	3.0		7.50	368.77	0.42	.038

Analysis of Scouting Progress

The results of the scouting period are shown in Table No. XXI on the preceding page.

The results of the scouting shown in this table were the direct outcome of a plan developed early in the season and put into effect immediately after the fire season ended. This plan has been fully described by Mr. Patty in his report on the 1926 scouting project. It will be seen that the costs per acre were considerably lower than the cost of work done by crews on similar types, when numbers of Ribes were comparable.

Recording Field Data

The field data were kept in such a manner that each day's work by each crew, whether it was a regular crew or a scout crew of any size, was a complete progress record. Field Form No. 1, and "Progressive Record" (Form WF-19-BRC) were used in keeping records. Field Form No. 1 was used in the field by crew foremen as a rough copy. At the end of the day these results were summarized and transferred to the permanent crew record book. It was then transferred to the progressive record blanks along with the progress of other crews working on the same block. In this manner work done on a block would be summarized. These forms are designated as Samples 1 and 2 at the end of this report.

The crew foreman's estimate of acreage was a mental one and naturally could not generally be accepted as accurate. If the total acreage summarized from foremen's estimates did not equal the accurate acreage, each day's acreages were prorated to accomplish this before the record was put up in final form.

By use of this method any person unfamiliar with the work could intelligently interpret the results in a comprehensive manner. Each day's record showed the amount of time spent on each type, the number of Ribes pulled of each species on each type and the number of acres included in each type. The acreage of each block and its boundaries were determined by a survey with Forest Service compass, topographic chain and Abney level. By having these data it was possible to compute the number of Ribes pulled per acre on each type for a given day. The record also showed the number of man-days of each class of labor applying to any type on a given day. With these available data it was possible to obtain figures showing the average number of acres worked per average man-day in each type for each day. These figures were of sufficient number in all cases that very accurate curves could be drawn, showing the number of acres eradicated per average man-day in any type for any number of Ribes per acre. The curves are shown on the forms on file at the Washington and Spokane offices.

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Analysis of Curves

It will be noted that there is a rather marked difference in the number of acres worked per man day for a given number of Ribes per acre between the certain types. In such cases there are several factors which were likely responsible. The most important factor was the difficulty of covering the area due to topography and density of brush. Species of Ribes is also a factor in determining difficulty, some species of Ribes being much easier to pull than others.

The figures from which the curves were constructed are shown in Table No. XXII. In addition to the computed averages of figures for the three units combined, it will be noted that there are figures taken from the constructed curves. The curves tend to smooth out the irregularities and approach results of a much more extensive operation. A comparison between the two averages reveals the extent of the irregularities and variations. The points of greatest variance were points at which insufficient data were available to give a fair average.

Table No. XXII.

Acres Worked per Man Day per Type for any Number of Ribes per Acre

Type	Camp	Number Ribes per Acre																								
		0	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-125	126-150	151-175	176-200	201-250	251-300	301-400	401-500	501-750	751-1000	1001 1500	1501 2000	2001 3000	3001 4000
Str.	1					0.6	1.6	.67	1.6	2.0	1.3	.7	1.1	1.4	1.5	.9	.9	.85	.82	.50	.44	.4	.32	.23	.20	.23
	2			5.5			3.16	2.00	3.3	2.3			.7	1.2	1.3	1.3	.25		.83	.51	.58	.25	.33	.26	.22	.10
	3				2.5		2.75	2.25	3.75	1.0					2.0		1.3	1.17		1.3		.3	.38		.19	.14
	Average			5.5	2.5	0.6	2.41	1.90	3.11	1.95	1.3	.7	.90	1.31	1.43	1.0	.82	.97	.33	.76	.49	.38	.33	.25	.20	.18
	Avg. from Curves			5.5	4.4	3.4	2.8	2.3	1.9	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.97	0.92	0.82	0.70	0.50	0.40	0.30	0.24	0.20	0.18
D.M.	1	18.1	5.2				5.3																			
	2																									
	3		56.0																							
	Average	18.1	12.4				5.3																			
	Avg. from Curves	18.4	14.0	10.0	8.4	7.1	6.0																			
O.M.	1		6.4	4.9							0.6			1.6												
	2		32.0			1.9	4.5											.62			.50	.62				
	3																									
	Average		10.0	4.9		1.9	4.5				0.6			1.6				.62			.50	.62				
	Avg. from Curves	20.0	11.4	7.2	4.8	3.6	3.0	2.5	2.2	1.9	1.7	1.6	1.4	1.23	1.15	1.1	1.0	0.9	0.8	0.7	0.6	0.5				
D.P.	1	10.0	14.0	4.7									2.3			1.9										
	2											2.3		2.1												
	3		48.0										1.0		1.2			1.40								
	Average	10.0	21.5	4.7								2.3	1.73	2.1	1.2	1.9		1.4								
	Avg. from Curves	21.0	16.0	8.0	6.4	5.2	4.2	3.9	3.4	3.2	2.8	2.6	2.3	2.0	1.8	1.6	1.4	1.2								
O.P.	1	8.0	14.0	4.9	3.3								2.3			1.92										
	2		20.3	2.5	2.2	1.9		1.4	1.8	1.3	1.2	1.2	.86	1.0	1.1	.62			.3		.3					
	3	10.0	15.73	9.24	6.44	4.1	4.86	4.0	3.87		4.1	4.0	2.5	1.86	2.83	2.07	.71	2.5	1.16	1.10	.50	.45	.4			
	Average	8.67	17.62	3.53	4.47	3.46	4.86	3.71	2.22	1.3	2.62	2.6	1.69	1.53	1.94	1.82	.71	2.5	1.07	1.10	.44	.45	.4			
	Avg. from Curves	15.0	12.0	8.8	6.4	5.2	4.2	3.9	3.4	3.1	2.8	2.3	2.1	1.9	1.7	1.5	1.4	1.2	0.8	0.7	0.6	0.45	.4			
D.R.	1	8.25	11.8	3.4	6.4																					
	2		1.4					.75	.75		1.5		.8		1.3	.75	.9	.67			.8					
	3																									
	Average	8.25	11.2	3.4	6.4			.75	.75		1.5		.8		1.3	.75	.9	.67			.8					
	Avg. from Curves	8.25	7.0	5.0	3.4	2.4	2.0	1.6	1.4	1.2	1.1	1.0	0.9	0.8	0.76	0.74	0.7	0.68	0.62	0.6	0.55					
O.R.	1	16.3	20.4	3.8	3.4	1.6	3.75	4.25						2.5												
	2			1.8			.9								0.5	.78				.44						
	3				4.28																					
	Average	16.3	20.4	2.53	3.76	1.6	1.81	4.25						2.5	0.5	.78				.44						
	Avg. from Curves	18.0	9.0	5.6	4.0	3.2	2.6	2.2	1.9	1.6	1.4	1.2	1.1	1.05	1.0	.95	0.9	0.8	0.65	0.5						

Note — Weighted averages used throughout.

Cost Computations

The following tables form the basis for all cost computations affecting 1926 eradication work. The first table shown, Table No. XXIII, is a summary of all expenses of the operation properly grouped and charged against each unit.

Table No. XXIII.

Cost Analysis.

Item	Camp	Training Period		Pre-Fire Period		Post-Fire Period		Total	
		Cost	% of Total	Cost	% of Total	Cost	% of Total	Cost	% of Total
Salary	1	$ 638.94	9.38	$1482.36	21.77	$ 830.40	12.20	$ 2951.70	43.35
	2	371.76	5.46	713.44	10.48	765.55	11.24	1850.75	27.18
	3	382.84	5.62	495.06	7.27	1129.17	16.58	2007.07	29.47
	Total	$1393.54	20.46	$2690.86	39.52	$2725.12	40.02	$ 6809.52	100.00
Cost of Supplies	1	$ 138.28	6.48	$ 406.89	19.07	$ 203.44	9.54	$ 748.61	35.09
	2	128.00	6.00	284.98	13.36	273.35	12.81	686.33	32.17
	3	136.86	6.42	191.30	8.99	369.62	17.33	698.28	32.74
	Total	$ 403.14	18.90	$ 883.67	41.42	$ 846.41	39.68	$ 2133.32	100.00
Cost of Cooking	1	$ 53.50	5.66	$ 140.00	14.81	$ 113.17	11.98	$ 306.67	32.45
	2	50.53	5.35	107.19	11.34	151.45	16.01	309.17	32.70
	3	62.87	6.65	75.35	8.02	190.78	20.18	329.50	34.85
	Total	$ 166.90	17.66	$ 323.04	34.17	$ 455.40	48.17	$ 945.34	100.00
Transportation of Supplies	1	$ 24.19	6.50	$ 69.54	19.00	$ 33.57	9.30	$ 127.30	34.80
	2	22.12	6.00	48.00	13.30	46.28	12.90	116.40	32.20
	3	24.00	6.50	32.40	9.00	63.63	17.50	120.03	33.00
	Total	$ 70.31	19.00	$ 149.94	41.30	$ 143.48	39.70	$ 363.73	100.00
Transportation of Men	1	$ 31.34	8.00	$ 92.06	25.00	$ 42.24	11.50	$ 165.64	44.50
	2	11.20	3.00	48.50	13.00	42.67	11.50	102.37	27.50
	3	18.60	5.00	33.60	9.00	52.03	14.00	104.23	28.00
	Total	$ 61.14	16.00	$ 174.16	47.00	$ 136.94	37.00	$ 372.24	100.00
Equipment Charge	1	$ 45.60	8.00	$ 142.50	25.00	$ 65.55	11.50	$ 253.65	44.50
	2	17.10	3.00	74.10	13.00	65.54	11.50	156.74	27.50
	3	28.50	5.00	51.30	9.00	79.80	14.00	159.60	28.00
	Total	$ 91.20	16.00	$ 267.90	47.00	$ 210.89	37.00	$ 569.99	100.00
Total	1	$ 931.35	8.30	$2333.35	20.90	$1288.37	11.50	$ 4553.57	40.70
	2	600.71	5.40	1276.21	11.40	1344.84	12.00	3221.76	28.80
	3	653.67	5.80	880.01	8.00	1885.03	16.70	3418.71	30.50
GRAND TOTAL		$2186.23	19.50	$4489.57	40.30	$4518.24	40.20	$11194.04	100.00

In this summary the apportionment was made in the following manner: Salary of each man was charged against the camp in which work was done by that man. Costs of supplies used in each camp were computed from accurate records kept in duplicate, showing items used in that camp. A double check, one as the goods left the warehouse and one as they were received at camp, was made. Costs of cooking includes salaries paid cooks and flunkies, costs of meals taken enroute by cooks and flunkies, and cost of travel of the same.

<u>Transportation of Supplies</u>:

Transportation of supplies includes trucking by Forest Service truck, hauling by private auto of field supervisor and cost of shipping goods by express. This charge was apportioned to the various camps according to the amount of supplies used.

<u>Equipment Charge</u>:

The remaining charge, that on equipment, including both a proportional cost of old and new equipment and the cost of transporting the same, was determined by the amount of equipment used, a proportional charge being made against each camp according to the equipment in use at that camp.

<u>Transportation of Men and Supervisors</u>:

Transportation of men was charged against the camp in which the various men were employed. In the case of men who worked in more than one camp the cost of transporting such men was distributed proportionally to the time worked in that camp. Travel charges of supervisor and assistant and the auto mileage was distributed proportionally according to the size of the operation.

<u>Composite Man-Day Charge</u>:

Before cost per acre for each unit could be figured it was necessary to compute the composite man-day charge for each camp. This necessitated the computation of the data shown in Table No. XXIV, following.

Table No. XXIV.

All Camps

Average cost scout day - - - - - - - - $4.10
Average cost foreman day - - - - - - - 3.10
Average cost assistant foreman day - 2.90
Average cost laborer day - - - - - - 2.70

Camp	Total Time				Total Cost of Operation	Cost of Labor on Operation	Composite Balance	Composite Cost per Man-Day
	Scout Days	Foreman Days	Ass't Foreman Days	Laborer Days				
1	32.50	110.50	76.75	556.75	$ 4553.57	$2201.60	$2351.97	$ 3.02
2	0.375	70.25	54.00	372.75	3221.76	1382.32	1839.44	3.70
3	34.25	41.625	68.50	324.50	3418.71	1344.27	2074.44	4.42
Total	67.125	222.375	199.25	1254.00	$11194.04	$4928.19	$6265.85	$ 3.60

It will be noted that the salary paid each class of labor was constant for all camps. All costs, other than actual salary paid these four classes of labor for days spent on actual eradication of Ribes, are properly summed up in a composite balance. This composite balance includes camp boss's salary, proportional charge of salary of field supervisor and his assistant, salary paid while traveling or engaged upon work other than eradication for which men were reimbursed by this Office, costs of meals, cost of equipment used, and other expenses. The results obtained by dividing the composite balance by the total man-days of the four classes, was the composite cost per man day.

Table No. XXV shows the total cost per man-day of each labor class for each camp and also the average cost for all camps.

Table No. XXV.

Total per Day in each Camp
For each Class of Labor.

Class of Labor	Camp			
	1	2	3	Average
Scout day	$7.12	$7.80	$8.52	$ 7.70
Foreman day	6.12	6.80	7.52	6.70
Ass't Foreman day	5.92	6.60	7.32	6.50
Laborer day	5.72	6.40	7.12	6.30

The data for Table No. XXV were computed in the manner shown in Table No. XXVI, following.

Table No XXVI.

Cost per Man-Day

Average daily pay, scout	$ 4.10
" " " foreman	3.10
" " " ass't foreman	2.90
" " " laborer	2.70

67.125 scout days @ $4.10 =	$ 275.21
222.375 foreman days @ $3.10 =	689.36
199.25 ass't foreman days @ $2.90 =	577.32
1254 laborer days @ $2.70 =	3385.80
1742.75	
Total labor cost	$4928.19

Total field cost of project	=	$11194.04
Total labor cost	=	4928.19
Balance	=	$ 6265.85

$\frac{6265.85}{1742.75}$ = 3.60 composite man-day charge.

Total cost scout day	=	$4.10 + $3.60 = $7.70
" " foreman day	=	3.10 + 3.60 = 6.70
" " ass't foreman day	=	2.90 + 3.60 = 6.50
" " laborer day	=	2.70 + 3.60 = 6.30

Cost average man-day - $\frac{11,194.04}{1,742.75}$ = $ 6.42

Method of Computing Costs:

This table shows the method of computing average costs for the entire operation. A similar method was used in making the computation for each camp.

Meal Costs:

Meal cost is an item of expense which will always vary greatly with the size of the unit. Costs will be correspondingly low when many meals are served and high when few meals are served. From 20 to 25 men in a camp seems to be the smallest number permitting employment of both a cook and a flunky. Camp 1 operated with an average of about 35 men and camps 2 and 3 with an average of about 22 and 20 respectively. The effect of numbers on meal cost is shown in Table No. XXVII, following.

Table No. XXVII.

Meal Costs

Camp	Total Cost of Subsistence of Men	Total Number Meals Chargeable	Cost per Meal
1	$1182.58	4527	$.261
2	1111.90	3077	.361
3	1147.81	2852	.403
Total	$3442.29	10456	$.329

This table shows the number of meals served in each camp, the total cost of these meals, and the cost per meal. It also shows the totals for all camps and the average meal cost. Subsistence, as before stated, covers cost of supplies, transportation of supplies, salary paid cooks and flunkies, and the travel and subsistence while traveling charge against cooks and flunkies.

Forms for Recording Cost Data:

Reference has been made to various forms which are used in the field. Samples 3, 4, and 5 at the end of this report were used for recording cost data. Sample 3 is the form used for keeping daily time of men. Sample 4 is used in recording meals. Sample 5 is the form used by camp bosses in requisitioning supplies or food.

Direction of Exposure and Effect on Eradication

A factor of outstanding importance and one which had much influence on the progress of the 1926 work was the direction and degree of slope mentioned earlier in this report. Amount of moisture present resulting from the direction and degree of slope caused the great variations found on these locations. A few facts were obvious after thorough scouting and examination of the areas. They are:

1. In general, northern and eastern exposures are much more densely covered with timber and brush than are slopes facing south or west.
2. Ribes are found in much greater number on north and east slopes than on south and west slopes.
3. The greatest variation in timber, brush, and Ribes present exists between the due north and south facing slopes and the least variation exists between the east and west facing slopes.
4. On this particular area the best white pine existed on the more gentle southern exposures. However, this condition seems to be only a local one as examination of many other areas reveal better stands of white pine occupying the north and east facing slopes where better soil and more moisture are found.

The following tabulation will help to bring out the variation between numbers of Ribes per acre on the different slopes.

Table No. XXVIII.

Relation between Direction of Exposure
and Number of Ribes per Acre

Camp	Block or Portion of Block	Exposures	Ribes per Acre
1	3	Part of block with south and southwest exposure	3.0
1	6	North	49.0
2	2	All slopes except north	15.5
2	4	South and west	4.0
3	2	North-northeast	111.5
3	3	All slopes	9.5

This tabulation will bear out the conclusions drawn above and is a fair sample of the variations to be found on various slopes.

Efficiency

An effort was made at all times to keep the efficiency of work done by crews at a high level. Early in the season much effort was spent in checking work by crews so that they might be impressed with the necessity of doing good work. The checking organization was relied upon to give specific information as to the character of work done. However, camp bosses and supervisors did much personal checking and supervision of the work of all crews throughout the season to satisfy themselves that the work was up to standard.

The reports of the foremen of the methods crews will give detailed analysis of the efficiency of the work in all camps.

Use of Tools

Considerable care was taken in having crews carry various tools to aid hand pulling. It was found generally that very little such aid was necessary to eradication, the bushes being of such shape and size as to make it possible to easily remove them by hand. After use of most of the available tools it was found that the trench pick was the most practical for general use. Crewmen must be watched, however, to prevent their using the sharp blade to cut roots off too near the surface.

On one particular area the bushes were found to be of enormous size and deeply rooted in the foot of a rock slide. It was impossible for men to get the roots by hand. A hurry-up order for miners' picks was sent in and these picks proved to be the only means by which the rocks could be pried apart, thus permitting pulling the roots out. Later on another area was found which required the same treatment.

Recommendations

With three seasons' experience as a basis, the following recommendations are made relative to the future of Ribes Eradication in the Inland Empire.

I. Organization. The most practical organization for use in the future is:

Field Supervisor - general supervisor of project.

- A. Supervisors of Methods and Scouting.
  - 1. Scout foremen.
    - a. Scouts.
- B. Checking foremen.
  - 1. Checkers.
- C. Camp bosses.
  - 1. Crew foremen and assistants.
    - a. Crewmen.
- D. Commissary clerk. Duties of the commissary clerk to keep property and supplies in stock, properly check out property and keep all camps supplied according to orders of the camp bosses. This will enable supervisor of operation to put whole time on general progress.

II. Further development of the scouting organization and the adoption of a plan providing for scouting either as a separate unit or in conjunction with crew work. In case of the former method the scouts would go onto an area in advance of crew work. They would work areas of few Ribes and mark out the areas to be worked by crews. They would provide a map showing plan of work. If the second method is followed scouts would immediately lay out the areas for crewmen to work and later work areas of few Ribes themselves.

III. Purchase of a light truck capable of hauling 12 or 15 men and from one to one and one-half tons of equipment or supplies. The necessity for such a vehicle has been apparent for some time and will be even more important in the future as the organization becomes more complex, the units of which move more independently.

IV. Use of string as a means of marking off areas as they are completed or for use in advance in laying off lanes in swamp type.

V. Use of camps of approximately 25 men including cook and flunkey. This unit is apparently the most efficient one for practical use. Records show that meals can be served economically to a camp of this size. Camps can be established for smaller areas, thus eliminating long walks to work. Light equipment, capable of being transported by pack train, is adaptable to a unit of this size. A larger camp requires larger stoves and generally heavier equipment. Most important of all, the camp boss is enabled to better supervise his work and the details of crew progress.

Sample 1.

Field Form No. 1.

Date ______________ Block ______________

Foreman ______________ Ass't Foreman ______________

Number Laborers ______________

Strip Numbers	Area (acres)	Total Time (hrs.)	R. lac.	R. vis.	G. iner.	Total Ribes	Type

Sample 2.

[illegible]-2b

PROGRESSIVE RECORD

LOCAL CONTROL — RIBES ERADICATION

Block____ Camp____ Location__________ Sheet___

Date	Days C.M.	Days Asst	Days For	Days Sc.	Total Ribes	R. lac.	R. vis.		Acres	Crew Method
Total										

Total Ribes per acre for Block

Map of Block

Sample 2.

-19-BRC-5-18-26

Block______ Camp______ Location______________ Sheet______

Eradication Type Data

	Type								Type								Type							
	Days				R.	R.			Days				R.	R.			Days							
Date	M	A	F	Sc	lac.	vis.		Acres	M	A	F	Sc	lac.	vis.		Acres	M	A	F	Sc	lac.	vis.		Acres
Total																								
Ribes per acre for type =									Ribes per acre for type =								Ribes per acre for type =							

Sample 3.

WF#8-BRC-Rev.7/7/26

DAILY TIME RECORD

Month of ____________________ Camp ____________________

Name ____________________ Timekeeper ____________________

Date	Paid Time								Unpaid Time					
	Crew	Foreman	Scout	Travel	Cooking				Rain	Fire	Sick	Compen-sation	Sundays & Holidays	No Work
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
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22														
23														
24														
25														
26														
27														
28														
29														
30														
31														
Total														

Sample 4.

MEAL RECORD

Location____________________ Project____________________ Month____________________

Camp____________________

Name	Meal	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total Meals
	B																																
	D																																
	S																																
	B																																
	D																																
	S																																
	B																																
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	B																																
	D																																
	S																																
Total Meals																																	

WF#10-BRC-6-1-25

REQUISITION FOR SUPPLIES

Date ______________________ In Charge of Camp ______________________

Project ______________________

Deliver following supplies to this camp on ______________________
(Date)

Item	Unit	Amount Ordered	Amount Received	Unit Price	Total Price

Supplies as listed above received on ______________________
(Date)

Name ______________________

(Note: Always to be furnished to warehouseman in duplicate)

DEVELOPMENT OF SCOUTING METHODS IN 1926 IN NORTH IDAHO

by

Frank A. Patty
Junior Pathologist

The purpose of these experiments was to devise some method or methods whereby certain areas having few Ribes per acre, usually in small scattered patches, might be eradicated at a lower cost than by former methods. The problem was to systematically eradicate the Ribes in the shortest possible time and still maintain a high eradication efficiency. A variation in the scouting system used in previous years partially solved the problem.

A limited amount of time has been spent on scouting each year since local control was first inaugurated in the West in 1922. Each season has seen some improvement in the manner in which this work was carried on and it was from experience gained during previous years that the methods about to be presented were partially evolved.

Prior to 1926 the scouts had been working alone or in pairs although there had been some eradication done (in white pine areas of Idaho in 1924 and in the Sugar pine forests of Oregon in 1925) with scout crews of experienced men. This work was done more with the idea in mind to eradicate a particular area than to develop a permanent system which could be generally applied. The annual reports indicate that very little scouting had been tried by the methods organization. This was probably due to the fact that the crew work required the entire time of methods organization during the years 1922-25. Close co-operation with one entire camp was necessary in order to make an experiment such as this successful. The two types of crew work (close formation and scout) dovetail with one another. Scouting as described here is, in reality, merely an experienced crew of varying numbers in deployed formation.

At the beginning of the 1926 field season it was evident that a better system must be developed by which to eradicate certain extensive areas having few scattered Ribes or Ribes in small patches. The first step was to form a crew of scouts by selecting four or five of the best men in each of the three camps, and in turn, a foreman for each scout crew. A crew was thus formed for each camp. Blocks were laid out by the camp bosses and the scout crews were assigned to work them with instructions to leave streams and swamps. These required intensive eradication due to the many Ribes present. The concentrations of Ribes which were left by the scouts were later pulled by the lesser experienced crews in close formation.

Several methods were tried to aid the scouts in covering acreage more efficiently and more rapidly.

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Several methods were tried to aid the scouts in covering acreage more efficiently and more rapidly.

One method was to have the scouts start the block by running a strip around it while the camp boss made the traverse. The reason for this arrangement was that it gave the scout foreman and his men an idea of a part of the area they were about to eradicate. The scouts could have been sent around the area at a different time but the above plan seemed to be best because the camp boss was there to give suggestions and help solve any problems which might come up at that time or later. Each block presented so many problems that it would have otherwise been necessary to have the camp boss on the ground many times, which would have been impractical.

Sometime later a second method was tried whereby the scout foreman was taken over the block by the camp boss shortly before his crew was to work it. They made a rough sketch locating drainages, ridges, block boundaries and Ribes concentrations. Also information was recorded which would enable the foreman to plan his work more efficiently. Strips were run across the block at varying intervals depending upon the size of the block and the eradication type. For example, in a block which was found to be dense mature type few strips were run because the Ribes grew almost entirely on the streams. On the other hand, in an open pole stand, strips were run closer together because the Ribes were more unevenly scattered. Usually one to one and one-half days was sufficient time for the scout foreman and the camp boss to make this rough preliminary survey. During the absence of the foreman one of his men was put in charge of the crew so that little time was lost.

The two methods just discussed helped the scouts to speed up their work but were not entirely satisfactory. Consequently, a third method was devised but not tried out for some time because at this stage of the work the fire season interrupted and operations were not resumed until August 20th in the latter part of the season.

The third experiment was carried on at camp three on Lower Lamb Creek with a group of picked men. This camp was selected because it presented more problems than the other camps due to the uneven distribution of the Ribes and the topography of the area. The scouts were divided into two groups, extensive and intensive. The extensive scouts were thoroughly experienced men who worked in pairs and who laid out the blocks and thoroughly and systematically scouted them to determine how they should be worked. Strips were run at five to ten chain intervals with a compass to determine the approximate distribution of the Ribes. Whenever a patch of Ribes was located which was large enough to necessitate crew work, it was blocked out by natural boundaries or by the use of string or paper. The natural boundaries such as ridges, streams, abrupt timber type lines and swamps were the most satisfactory markers.

The intensive scout crew was made up of two to five men. The four man crew, which included the foreman working in the line, proved to be the most satisfactory method after many tests were made with various numbers.

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The men kept their alignment by "counting off" across the line. The guide or the man following the trail was number one, the man next to him was number two and so on across. Frequent counting was necessary to keep the crew from becoming confused. Whenever a patch of Ribes was found, one man or often the entire crew assembled to eradicate the bushes. After this was done they resumed their deploy formation again.

The course which the scout took was not a straight line for each scout followed a zig-zag course investigating open spots in the timber, upturns, rocky slopes, wet places, small streams and any other location where Ribes were apt to be growing.

Unlike the ordinary crew the scouts did equally good work going up or down the hills or parallel to the contours. They were more experienced and consequently more observing than the crew men. One very good system used was for scouts to travel along the contour of the hill, starting at the bottom and gradually working up strip by strip. By this method the drainages were crossed at right angles.

String and paper were the materials used to mark the trails. The string was carried on the back of the trail marker in a small wooden box much as a pack sack would be carried. The spool was so arranged that it automatically unwound as the man proceeded on his course. By running the string through a hole in the top of the box, enough friction resulted to keep the string tight. Thus, it was entirely out of the way and left both hands of the marker free. The string was tied to a tree or bush at the starting point and broken and retied every four or five hundred feet. This was done so that if it were broken by man or animal only a small portion of the trail would be lost. No trouble was experienced with animals breaking the string during a period of two weeks. There was no stock grazing in this district. This was the first time string had been used in the West for scouting experiments.

The three-ply twine proved to be very satisfactory. It was sufficiently strong and had eleven thousand feet of twine per spindle.

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The three-ply twine proved to be very satisfactory. It was sufficiently strong and had eleven thousand feet of twine per spindle.

In some cases one spindle was sufficient for a crew's use for the entire day but as a rule a crew needed two spindles for one day's work. The amount of string necessary will be varied a great deal from day to day, however.

Pieces of magazine paper 2"x4" and 4"x4" cut diagonally across, were strewn on the ground every three or four feet. These different sized pieces of magazine paper made fairly good trail markers. This type of trail was fairly easy to lay as the trail marker could investigate Ribes patches without having to lay his paper bag on the line. The paper bag was a little awkward to carry and only one hand was free as the other one was needed to drop the paper. It was necessary for the guide to follow very close to the paper trail as it was visible only a few feet under most conditions.

Probably the worst feature of the twine was that the box had to be put down on the ground every time it was necessary for the trail marker to move away from his line.

The visibility of the twine and the speed with which it can be laid, makes it superior to the pieces of magazine paper for marking trails.

Most of the work was performed by two or three men working as a scout crew. These men worked in both extensive and intensive scout crew formation with the assistance of a few picked crew men when needed, but the work done was not segregated. There were forty-four and three quarters scout days worked which included seven and one-half crewman days and three crew foreman days. A total of 9721 Ribes were pulled on 886 acres with R. viscosissimum first in number, R. lacustre next and G. inermis third. The average number of Ribes per acre was eleven. (See table number one.)

The total of 886 acres for scouting was done by the special scout crew. As rapidly as the methods were developed they were adopted by the scouts in the other camps.

All of the work at Camp Three was carried on near the end of the season when the men's enthusiasm for the work was not at its average height. This was especially true this year because the men had spent so much time fighting fires that they were not very anxious to return to blister rust work. Considerable time was lost on account of rain which started near the latter part of August. All of these factors will bring the cost per acre higher than would normally result on this type of eradication.

The average of slightly less than twenty acres per man day is very good considering all of the adverse factors.

Table No. 1

Eradication Record of Special Scout Crew
at Camp No. 3, on Lower Lamb Creek
Aug. 20-Sept. 13, 1926

Date	Days: Scout	Days: Foreman	Days: Laborer	Total Ribes	Ribes lac.	Ribes visco.	G. iner.	Acres	Crew Method
Aug. 20	3			741	270	471		172	Scout
" 21	2			204	40	164		51	"
" 23	2			162	137	25		55	"
" 24	2			425	145	280		40	"
" 25	2			224	52	172		120	"
" 26	$2\frac{1}{4}$			202	34	168		20	"
" 27	2			53	53			47	"
" 28	2			201	201			80	"
Sept. 2	3			305	244		61	35	"
" 3	2			184	44	110	30	71	"
" 4	3			1166	526	640		105	"
" 8	3			449	428	21		27	"
" 10	3		2	1173	24	1149		5	"
" 12	$\frac{1}{2}$	1	$\frac{1}{2}$	1804	44	1760		3	"
" 12	$\frac{1}{2}$		1	1597	23	1574		3	"
" 13	1	2	3	552	532	20		47	"
" 13	1		1	279	199		80	5	"
Total	$33\frac{1}{4}$	3	$7\frac{1}{2}$	9721	2996	6554	171	886	"

Table No. II.

Eradication Record of Special Scout Crew
at Camp No. 2, on Lower Lamb Creek
by Eradication Types.

Types	Ribes per Acre: Total Per Acre	R. lac.	R. vis.	G. iner.	Acreage	Days: Scout	Foreman	Laborer
Stream	46.2	37.7		8.5	20.0	5 1/8	¼	1 3/8
D. R.	23.8	23.8			5.0	1/8	¼	3/8
D. P.	1.4	1.1	0.3		432.0	8 ¼		
D. M.	0.2	0.2			210.0	4		
O. P.	36.6	7.3	29.3		219.0	16 3/4	2 ½	5 ¾
Total& Average	11.0	3.4	7.4	0.2	886.0	34 ¼	3	7½

Recommendations for 1927.

There are a number of different experiments which should be tried where proper conditions exist

Method I.

Method I is a unit organized as Follows:

Camp Boss

Cook & Flunky

Camp Scout — 8 men or 2 scout crews

8 or 10 crew men
2 crew foremen

The camp boss and the camp scout would act as the extensive scout crew, doing all the advance scouting, laying out blocks, determining how certain areas should be worked and, when time permits, elimination of certain areas. The camp scout would be responsible for the work done by the scout crew. This would give the camp boss sufficient time to supervise his crews and also help with the intensive scouting. If it were necessary the scouts could work in advance of the crew men, even in different camps, but this would necessitate different arrangement of the organization.

The men composing the scout crews should be carefully selected (preferably foresters) so that they could map the Ribes concentrations when their work is very far in advance of the crew. It would be advisable to pay these men from ei hty-five to one hundred dollars a month. The crew men would not need a increase over what they were receiving in 1926.

This above type of unit would be more or less flexible, and the relationship in numbers between scouts and crew men would vary according to conditions found.

Method II.

Laying string on a compass line. This gives the scouts lanes to clean out and probably eliminates many jogs in a crew line which causes the loss of so much time to a deployed crew.

Method III.

Study of Scouting Methods.

A more intensive study of scouting should be made. Perhaps a separate scouting organization would be desirable, thus making scouting work a separate operation to be done ahead of close formation crew work.

Method IV.

Organization of the methods work under the project leader.

By this means, better co-operation may be secured. Allow the checking to be independent and done by a separate crew.

REPORT ON COOPERATIVE WORK BETWEEN THE WESTERN OFFICE OF BLISTER RUST CONTROL AND NORTH IDAHO TIMBER PROTECTIVE ASSOCIATIONS

by
J. L. Bedwell,
Assistant Pathologist.

This report covers work done during the period from January 1 to Dec. 31, 1926, according to article #7 of the Idaho Agreement (See page ____ of this annual report). It includes all work done by this Office in cooperation with the Clearwater, Coeur d'Alene, Pend Oreille, Potlatch and Priest Lake Timber Protective Associations.

The objects of this work were:

I. Educational

The man in charge of the work in each association has been familiarized with the disease both on pine and currants under field conditions by a trip to infection areas at Cheekye and Daisy Lake, British Columbia. These association leaders have disseminated information regarding blister rust among the employees of the associations and any others with whom they came in contact in the field. On the Pend Oreille and Potlatch associations, letters were written by the association leaders and sent to all employees of these associations. Copies of these letters are appended.

II. Scouting for the Disease

The men engaged on reconnaissance, during the course of the field work, inspected native blister rust host plants for the disease. After reconnaissance work was discontinued for the season, each association leader covered his association area scouting for the disease and locating areas for future examination.

No blister rust was found in any of the associations this season.

III. Collection of Data

Collection of all available data regarding the timber lands of the associations: this work is to supplement and correct previous work and consists in the examination of county records, Forest Service records, association records, and records of private owners, for information pertaining to ownership status and timber conditions of lands within the boundaries of each association. All of these data which have been collected are being placed in permanent form on card indexes and maps. This type of work is carried on in the winter.

IV. Reconnaissance Work

A. Purpose of work:

From records already prepared the location and amounts of white

pine are determined. Ribes data, etc., are taken in the field on these areas to demonstrate the feasibility of local control by comparison of these data with those on areas already covered by experimental local control. Also the first ground work is done in preparation for local control so as to constitute a saving in time when such work is to be done.

B. Personnel

The reconnaissance work on all the associations was performed under the general supervision of the Office of Blister Rust Control with the crew on each association area in charge of the permanent leader for that association. The crews were composed of graduates in forestry or upperclassmen of the leading forest schools of the Northwest who had had several seasons of practical woods experience.

C. Training Period

A training camp was held at Fernwood, Idaho from June 20th to July 1st and another at Coolin, Idaho for the same period for the purpose of training the temporary crew men. The Pend Orielle and Priest Lake Association crews were at the Coolin camp and the Potlatch, Clearwater and Coeur d'Alene association crews at Fernwood.

Preliminary training consisted in familiarizing the men with the native Ribes of the region and the common shrubs associated with them. The men were also given a review in the identification of the true species of the region. The greater portion of the period was spent instructing the men in methods and practical application of these methods on the ground by working sections having a variety of conditions.

D. Reconnaissance Methods

The areas covered by reconnaissance on each association were worked by the same standardized methods. In general these methods consisted in mapping the section on a field map sheet on the scale 4 inches = 1 mile. The map included streams, cultural features, timber, age class, and eradication types separated by dotted lines. Data were then taken on plots uniformly spaced throughout each type the findings being entered on field note sheets. This information was summarized in the field for each section.

Details of the methods employed are shown in the following instructions for control reconnaissance. Samples of the field map sheet, field note sheets and field section summary sheets are enclosed.

WF-24-BRC-6-12-26

Sec. T. R. Locality

Erad. Type Timber Type Age Class Acres

Plot		0-1		1-6		6-12		Over 12		Composition	
No.	Size	W.P.	Other	W.P.	Other	W.P.	Other	W.P.	Other	Over story	Under story
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Plot		Ribes Species									Brush Density	Wind fall	Rock T.B.
No.	Size	1	3	3+	1	3	3+	1	3	3+	Tenths	H.M.L.	O.
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

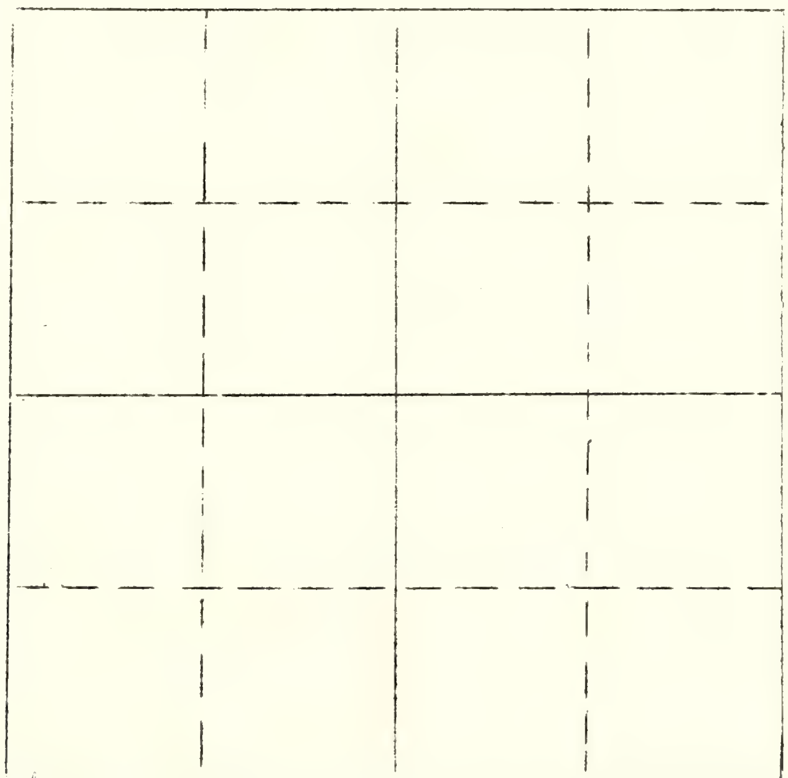
Remarks:- Exposure, brush genera, date of cutting or burn, condition of timber and Ribes, etc.

WF-25-BRC-6-12-26

Sec._____ T._____ R._____ Locality____________________

Mapped by____________________ Date__________ 1926

Notes by ____________________ Date__________ 1926



Scale 4 in. = 1 mile
(Legend on reverse side)

SECTION SUMMARY

S. T. R. Locality

Windfall	Rock		Ribes per Acre															
	Class	Abundance											Total Ribes			
			1	1-3	3+	Total	1	1-3	3+	Total	1	1-3	3+	Total	1	1-3	3+	Total

SECTION SUMMARY

S. T. R. Locality Mapped by Date Notes by Date

Erad. Type	Timber		Plot Acres	Type Acres	Trees per Acre								Stand Composition		Genera	Den %
	Type	Age Class			0-1		1-6		6-12		Over 12		Overstory	Understory		
					W.P.	Other	W.P.	Other	W.P.	Other	W.P.	Other				

Remarks:-

Instructions for Performing
Control Reconnaissance

I. Purpose:

The purpose of control reconnaissance is to make a rapid systematic survey of the white pine region to determine (1) the extent and distribution of white pine types, and (2) the factors influencing the cost and methods of eradicating Ribes thereon.

II. Methods:

In brief, the method of performing control reconnaissance is as follows: Each man works a section alone, under the supervision of the Chief of Party. He maps in type limits and then studies each type from the standpoint of blister rust control by means of representative sample plots.

The actual details of work may be considered in 3 steps: (1) the division of a section into eradication types, timber types and timber age classes; (2) obtaining by means of sample plots detailed information on each type; and (3) compilation of data on sectional basis in final form.

A. Typing: The section and such areas adjacent thereto as can be readily seen will be covered in such manner that all types will be seen, sketched in, and properly designated as to eradication type, timber type, and timber age class. This may be done by any one of the following methods or similar methods, as is best adapted to local topography.

The mapper may cover the section by starting at a quarter corner, running a line to each of the other three quarter corners and closing on his starting point.

He may run through the center of two quarters, offset a half mile on the section line, and return through the center of the two remaining quarters.

He may start at a section corner, run diagonally across a corner forty, then traverse the section on forty lines.

He may start at a known point on the section and run a random line on the section, plotting his course as he goes.

The essentials for the mapper to bear in mind are: (1) always to keep himself oriented, and (2) to be sure that all types have been covered. Whatever method he uses, the mapper should tie in to some land office corner. Distances will be measured by pacing and directions taken by box compass.

Designation of Types: The standard classification of forest types as used by the Forest Service will be used. A copy of definitions of these types accompanies these instructions.

The age class of a timber stand will be that age class which will next be logged. The following timber age classes will be recognized:

1 - 10 years
11 - 20 years
21 - 40 years
41 - 60 years
61 - 80 years
81 - 100 years
101 - 200 years
200 + years
Mixed Ages

An eradication type is an area on which eradication working conditions are similar. There will be eight eradication types defined as follows:

1. Dense mature (D.M.) a stand of timber 12" D.B.H. or over, which is fully stocked or nearly so, and generally, but not necessarily, contains little brush and few Ribes, except in openings or moist spots.

2. Open mature (O.M.) a stand of timber 12" D.B.H., or over, which is understocked, this conditons generally resulting in the presence of brush and Ribes.

3. Dense pole (D.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is fully stocked or nearly so, and generally but not necessarily, contains little brush and few Ribes.

4. Open pole (O.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is understocked, this condition generally resulting in the presence of brush and Ribes.

5. Dense reproduction (D.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are uniformly and thickly distributed over the ground. Brush and Ribes may or may not be present.

6. Open reproduction (O.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are unevenly distributed in patches, over the ground, the intervening openings generally containing brush and Ribes if other conditions are favorable.

7. Stream type (St.) an area varying in width along a stream which, due to the opening in the timber stand and presence of moisture, presents a favorable situation for the growth of Ribes and associated brush.

8. Brush (Br.) an area either cut or burned over or of waste land on which reproduction has not yet occurred but on which Ribes may occur contiguous to white pine type.

B. Recording data: Information on each type will be obtained by means of one man sample plots distributed over the type in such manner

Table No. I.

Percentage of Each Association Covered
by Reconnaissance in 1926.

Association	Area in Acres	Acres worked 1926	% of Total
Clearwater	702,760 *	38,400	5.4
Coeur d'Alene	1,301,000 ǂ	46,240	3.5
Pend Oreille	700,000 *	33,280	4.7
Potlatch	806,400 *	39,164	4.8
Priest Lake	237,000 #	37,945	16.0
Total	3,747,160#	195,029	5.2

* Areas were obtained from State Forester's Notice dated 1925.
ǂ Exclusive of National Forest Land within Association boundary.
\# Approximate

2. Summary of distribution of time of reconnaissance men: The number of man days spent by the men on each association reconnaissance crew is shown in the following table:

Table No. II.

Time Analysis Summary

Association	Travel	Sick	Office	Moving Camp	Rain	Fire	Reconnaissance	Training	Sundays and Holidays	Total Time
Clearwater	15		12	17	12		152	27	29	264
Coeur d'Alene	19		27	19	4		194	36	48	347
Pend Oreille	8	9	9	27	26	6	109	24	38	256
Potlatch	9		35	26	14	7	112	27	26	256
Priest Lake	17		4	14		222	125	48	42	472
Total	68	9	87	103	56	235	692	162	183	1595

Time charged to moving camp includes time spent in breaking up the old camp, travelling to the new site and establishing the new camp.

3. Cost of Reconnaissance: The cost of training the new men and the cost of reconnaissance work itself is shown in the two tables below.

Table No. III.

Costs of Training Period

Association	Subsistence	Equipment	Transportation of Men	Salaries	Total	No. of Men	Cost per Man
Clearwater	51.50		8.12	108.53	168.15	3	56.05
Coeur d'Alene	62.00		13.02	163.18	238.20	4	59.55
Pend Oreille	42.78		7.14	95.00	144.92	3	48.30
Potlatch	49.50		8.54	108.24	166.28	3	55.42
Priest Lake	93.25	3.00	9.94	186.67	292.86	6	48.81
Total	299.03	3.00	46.76	661.62	1010.41	19	53.18

Table No. IV.

Costs of Reconnaissance
Summary

Association	Subsistence	Equipment	Transportation of Men	Salaries	Total	Acres Worked	Cost per Acre
Clearwater	226.34	43.25	46.59	758.33	1074.51	38,400	.028
Coeur d'Alene	371.14	51.00	91.33	1035.50	1611.13	46,240	.034
Pend Oreille	227.46	22.70	39.54	652.83	942.53	33,280	.028
Potlatch	269.54	94.70	28.87	704.99	1102.10	39,164	.028
Priest Lake	230.75	90.04	22.77	585.17	928.73	37,945	.024
Totals and Averages	1325.08	301.69	229.10	3736.82	5659.00	195,029	.029

Cooperative Agreements Between the Office of
Blister Rust Control and the Five North
Idaho Timber Protective Associations

The formal agreement between the office and its cooperators is to be found on page ___ of this report. The following is a brief summary of the informal working plan that was agreed upon for the expenditure of the sums allotted.

I. Clearwater Association

The association agreed to pay the salary and expenses of two assistants for three months and Mr. Painter's expenses for the same period. The Office of Blister Rust Control agreed to pay Mr. Painter's salary for the fiscal year July 1, 1926 - June 30, 1927 and his expenses for nine months.

II. Coeur d'Alene Association

The association agreed to pay Mr. Rodner's salary for the fiscal year July 1, 1926 to June 30, 1927. The Office of Blister Rust Control agreed to pay the salary and expenses for three assistants for three months and Mr. Rodner's expenses for the year.

III. Pend Oreille Association

The association agreed to pay Mr. Geil's salary for the fiscal year. The Office of Blister Rust Control agreed to pay the salary and expenses of two assistants from July 1 to September 30 and expenses for Mr. Geil for the fiscal year.

IV. Potlatch Association

The association agreed to pay Mr. Myer's salary for the fiscal year. The Office of Blister Rust Control agreed to pay Mr. Myer's expenses for the fiscal year and the salary and expenses of two assistants from July 1 - Sept. 30.

V. Priest Lake Association

The association was financially unable to carry their share of the work this year so it was agreed that the Office of Blister Rust Control finance the entire expense this year and the association expend an equivalent amount next year.

BLISTER RUST CONTROL WORK ON LANDS OF CLEARWATER TIMBER PROTECTIVE ASSOCIATION

Office of Blister Rust Control,
Bureau of Plant Industry,
and Clearwater Timber Protective Association,
Cooperating.

* *

Summer, 1926.

* * *

1. Purpose of Work

The purpose of the work was three fold as follows:

a. To survey the white pine stands in the association by control reconnaissance to determine (1) extent and distribution of white pine type and (2) the factors influencing the cost and methods of Ribes eradication.

b. To search for blister rust.

c. To establish inspection points representing locations favorable for blister rust infection on the most susceptible currants and gooseberries (Ribes) in order to systematize and simplify future searchings for blister rust.

2. Results of Control Reconnaissance

Personnel

Personnel consisted of a field supervisor, Mr. J. L. Bedwell, chief of party, Mr. W. F. Painter, and two temporary assistants.

Training

A training period for the three southern associations, namely, Coeur d'Alene, Potlatch and Clearwater, was held at Fernwood, Idaho, from June 21 to July 2, for three reasons: (1) to thoroughly familiarize new men with reconnaissance method to be used during summer, (2) to have definite understanding among association chiefs of party as to judgment of eradication types so as to have all work on a uniform basis to insure some comparison of the results at close of season, and (3) to judge or estimate potential ability of temporary men.

Area Worked, 1926

a. 38,400 acres were covered by intensive reconnaissance during the summer, 1926. This represents about 5.5% of the association territory.

b. Ownership status.

State of Idaho - 11,580 Acres, or 30% of area worked.
Private - 23,839 Acres, or 62% of area worked.
Dep't. Interior - 2,981 Acres, or 8% of area worked.

BLISTER RUST CONTROL WORK ON LANDS
OF CLEARWATER TIMBER PROTECTIVE ASSOCIATION

Office of Blister Rust Control,
Bureau of Plant Industry,
and Clearwater Timber Protective Association,
Cooperating.

* *

Summer, 1926.

* * *

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Area Worked, 1926

a. 38,400 acres were covered by intensive reconnaissance during the summer, 1926. This represents about 3.5% of the association territory.

b. Ownership status.
State of Idaho - 11,550 Acres, or 30% of area worked.
Private - 23,839 Acres, or 62% of area worked.
Dep't. Interior - 2,981 Acres, or 8% of area worked.

The reconnaissance work during the summer 1926 was carried on in three townships, T. 37 N, R. 5 E, T 38 N, R 5 E and T 39 N, R 5 E, Boise Meridian.

In T. 37 N, R 5 E, Lower Quartz Creek, Three Mile Creek, Two Mile Creek, and Canal Gulch were reconnaissanced from Clearwater Timber Company Camp No. 1, located some three miles north of Pierce, Idaho, one mile off main Pierce-Headquarters road. Beaver Creek, Trail Creek and Middle Quartz Creek areas were covered from Clearwater Timber Company Camp No. 3, which is located seven miles north of Pierce, Idaho, one mile off main Pierce-Headquarters highway. Upper Quartz Creek and Snake Creek, areas which lie in the Northwestern portion of the township and three sections, 31, 32 and 33 in T 38 N, R 5 E, were reconnaissanced from an established camp in NE ¼ of Sec. 5 in T 37 N, R 5 E.

In T 38 N, R 5 E, three established camps were necessary in order to carry on work in designated areas within the township. White Meadows, located two miles south of Headquarters on the Headquarters-Pierce highway, served as base for the area worked in southeastern portion of township. Eureka Cabin, located on Reeds Creek some three miles west and south of Headquarters, served as base for area covered in southwestern portion of the township. Casey Meadows, located five miles north of Headquarters on the Trail between Headquarters and Silver Butte was base for work done in northwestern portion of the township.

The area covered in T 39 N, R 5 E, which included practically the whole of the southwestern portion in the township, was reconnaissanced from Neishams Cabin, located in Sec. 29, some eight miles north of Headquarters.

Accessibility of Areas

All supplies for necessary operation within the northern portion of the association are transported by truck from Orofino, Idaho, to Pierce, Idaho, over a well graveled highway. A secondary road of 15 miles between Pierce, Idaho and Headquarters necessitates transportation of supplies from Pierce to Headquarters by team and wagon except for some two months during the summer when the road is normally passable by car or truck. Due to distance and difficulty of transportation the cost of supplies is increased proportionately. Supplies for control reconnaissance were furnished at actual cost plus transportation and handling charge.

The area adjacent to Neishams Cabin which is located in T 39 N, R 5 E, is accessible from Pierce, Idaho, by road to Headquarters and thence by trail for eight miles.

The area covered adjacent to Casey Meadows is accessible by auto to Headquarters and thence by trail a distance of five miles. Eureka Cabin, located in the southwestern portion of T 38 N, R 5 E, may be reached by road to Headquarters and thence by trail for a distance of four miles. The Whites

Meadow area in the southeastern portion of township is accessible from main road between Pierce, Idaho, and Headquarters, the area being some two miles south of Headquarters.

The area covered in T. 37 N., R. 5 E., was accessible by road for the most part.

Summary of Field Data Secured

Field information was taken on the basis of Ribes eradication types. These are areas representing growth conditions sufficiently uniform to enable the use of a given method of Ribes eradication as protection against blister rust. These eradication types are being used by the Office of Blister Rust Control in their experimental Ribes eradication work and are uniform for the entire Idaho white pine belt.

Types are as follows:

1. Dense mature (D.M.) a stand of timber 12" D.B.H. or over, which is fully stocked or nearly so, and generally, but not necessarily, contains little brush and few Ribes, except in openings or moist spots.

2. Open mature (O.M.) a stand of timber 12" D.B.H., or over, which is understocked, this condition generally resulting in the presence of brush and Ribes.

3. Dense pole (D.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is fully stocked or nearly so, and generally but not necessarily, contains little brush and few Ribes.

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5. Dense Reproduction (D.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are uniformly and thickly distributed over the ground. Brush and Ribes may or may not be present.

6. Open reproduction (O.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are unevenly distributed in patches over the ground, the intervening openings generally containing brush and Ribes if other conditions are favorable.

7. Stream type (St.) an area varying in width along a stream which, due to the opening in the timber stand and presence of moisture, presents a favorable situation for the growth of Ribes and associated brush.

8. Brush (Br.) an area either cut or burned over, or of waste land, on which reproduction has not yet occurred but on which Ribes may occur contiguous to white pine type.

Summary of Areas Reconnaissanced (Acres)

Timber Type, Timber Age Class and Eradication Types.

Table No. I.

White Pine Type

Eradication Type	10-20	21-40	41-60	61-80	81-100	101-200	200 +	Totals
O. M.					360	24069	1400	25829
D. M.					140	1852	65	2057
O. P.			10	335				345
D. P.			40					40
C. R.	903	3769						4672
D. R.			200					200
Total	903	3769	250	335	500	25921	1465	33143
Non White Pine Type								
O. M.					490	2530	305	3325
D. M.					800			800
C. P.				100				100
D. R.		10						10
Total		10		100	1290	2530	305	4235
Non Timber Type								
Stream								496
Brush								165
Meadow								566
Grand Total	903	3779	250	435	1790	28451	1770	38,400

Ribes Conditions

Five species of Ribes were found as follows:

1. Wild black currant (Ribes petiolare), a moisture loving species growing in profusion along streams.

2. White stemmed gooseberry (Grossularia inermis), similar in its requirements to wild black currant.

3. Prickly currant (Ribes lacustre), the least exacting species as to moisture and light and hence more widely distributed.

4. Sticky currant (Ribes viscosissimum), demands ample light but little moisture. Found on burns, reproduction and in poorly stocked mature or pole stands.

5. Inland black gooseberry (Grossularia irrigua), of secondary importance on account of limited distribution.

Of the total area of 38,400 acres worked, 14,111 acres, or 37 %, contained no Ribes. Of the balance, 12,907 acres, or 34 % of the total, contained not more than 10 Ribes per acre. Estimates based on experimental Ribes eradication performed this year by the Office of Blister Rust Control shows that of this 38,400 acres 27,018 acres could probably be worked by eradication crews for an average cost of 35¢ per acre. Areas found free of Ribes by reconnaissance crews must be rapidly worked over to be certain that no small patches of these plants are missed. The balance of the area would represent a higher cost, depending on working conditions as expressed by the eradication types and by number Ribes per acre.

The following table shows the acreage of the various eradication types and the average Ribes per acre in each type.

Table No. II

Table Showing Average Number of Ribes per Acre
Within Eradication Types

Eradication Type	Acres	Average per A.
Dense Mature	2357	0
Dense Pole	40	0
Dense Reproduction	210	0
Open Mature	29154	12
Open Pole	445	40
Open Reproduction	4672	64
Stream	493	447
Brush	163	21
Meadow	366	0
Totals and Averages	38400	26

Cost of Reconnaissance

Money Expended for reconnaissance from July 1 to Sept. 15, 1926:

Federal ---------------------	$344.92
Association -----------------	729.59
Total --------------------	$1074.51

38,400 acres were covered by intensive reconnaissance during the summer of 1926 at a cost of .028¢ per acre.

3. Results of Searching for Blister Rust

The employees were constantly on the lookout for the disease. Mr. Painter, in charge, is familiar with the disease on both pines and currants. No indication of the disease was found during the summer.

4. Location of Inspection Plots

Three permanent inspection plots were established on different areas of the Association to assist and simplify future scouting for blister rust. It is the plan to inspect these areas at regular intervals in the future to ascertain when the disease has entered the Association.

BLISTER RUST CONTROL WORK ON LANDS OF COEUR D'ALENE TIMBER PROTECTIVE ASSOCIATION

Office of Blister Rust Control
Bureau of Plant Industry,
and Coeur d'Alene Timber Protective Association
Cooperating.

* * *

Summer, 1926.

* *

1. Purpose of Work

The purpose of the work was three fold as follows:

a. To survey the white pine stands in the association to determine (1) the extent and distribution of white pine type and (2) the factors influencing the cost and methods of Ribes eradication.
b. To search for blister rust.
c. To establish inspection points representing locations favorable for blister rust infection on the most susceptible currants and gooseberries (Ribes) in order to systematize and simplify future searchings for blister rust.

II. Results of Control Reconnaissance

A. Personnel

The personnel consisted of a field supervisor, a chief of party and three temporary assistants.

B. Training

A training period for the three southern associations, namely Coeur d'Alene, Clearwater and Potlatch, was held at Fernwood, Idaho, from June 21 to July 1 inclusive. This training period was intended (1) to familiarize the new men with the reconnaissance method to be used and (2) to have a definite understanding among the association chiefs of party as to designation of types so that all work would be on a uniform basis (3) to judge or estimate potential abilities and personalities of the temporary employees.

C. Area Worked

a. A total of 46,240 acres were covered by reconnaissance during the summer of 1926.
b. Exclusive of National Forest land included within the association 3.5% of the association was covered this season.
c. Ownership status of land covered this Season:
   State of Idaho 2,400 acres, or 5%.
   Private 37,600 acres or 81%.
   Dep't. of Interior 1,680 acres or 4%.
   Forest Service 4,560 acres or 10%.

BLISTER RUST CONTROL WORK ON LANDS
OF COEUR D'ALENE TIMBER PROTECTIVE ASSOCIATION

Office of Blister Rust Control
Bureau of Plant Industry,
and Coeur d'Alene Timber Protective Association
Cooperating.

* * *

Summer, 1926.

* *

I. Purpose of Work

The purpose of the work was three fold as follows:

a. To survey the white pine stands in the association to determine (1) the extent and distribution of white pine type and (2) the factors influencing the cost and methods of Ribes eradication.
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A training period for the three southern associations, namely Coeur d'Alene, Clearwater and Potlatch, was held at Fernwood, Idaho, from June 21 to July 1 inclusive. This training period was intended (1) to familiarize the new men with the reconnaissance method to be used and (2) to have a definite understanding among the association chiefs of party as to designation of types so that all work would be on a uniform basis (3) to judge or estimate potential abilities and personalities of the temporary employees.

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   - State of Idaho 2,400 acres, or 5%.
   - Private 37,600 acres or 81%.
   - Dep't. of Interior 1,680 acres or 4%.
   - Forest Service 4,560 acres or 10%.

D. Location of Areas

The reconnaissance work during the summer of 1926 was carried on in five townships, T 43 N, R 2 W, T 43 N, R 3 W, T 44 N, R 2 W, T 44 N, R 3 W., T 44 N, R 1 W.

T 44 N, R 1 W. Sections 16, 19, 20 and 21 are just west of the town of Santa and are included in the Santa Creek and St. Maries River drainages.

T 43 N, R 2 W. The sections worked in this township includes the drainages of Charlie Creek, Deep Creek and part of Willow Creek.

T 43 N, R 3 W. The East Fork of Santa Creek and the upper part of Willow Creek drainages were worked in this township.

T 44 N, R 2 W. In this township the Little John Creek, Bob Creek and small unnamed tributaries of Santa Creek were worked.

T 44 N, R 3 W. The headwaters of Santa Creek and Big John Creek were covered by reconnaissance in this township.

Accessibility of Areas

T 44 N, R 1 W. The areas worked in this township are easily accessible by automobile the main Tekoa-Santa highway running through or adjacent to them.

T 43 N, R 2 W. This township was worked from two camps. The first camp was located in the NW ¼ of Sec. 15 and was reached by pack trail. Supplies were transported by pack horses a distance of about two miles by trail from the road on Charlie Creek. The second camp was located on the Emida-Harvard road on Willow Creek in Sec. 12 of T 43 N, R 3 W. This camp was accessible by car.

T 43 N, R 3 W. The areas worked in this township were reached from the last camp described above and another camp located at the Mc-Goldrick ranch in Section 36, T 44 N, R 3 W, on the main Tekoa-Santa highway.

T 44 N, R 3 W. The southern part of this township was worked from the camp at McGoldrick's ranch and the northern part from a camp on John Creek in Sec. 18, T 44 N, R 2 W. This latter camp was reached by means of a truck over a very poor secondary road about six miles from Emida.

T 44 N, R 2W. The northwestern part of the township was worked from the camp on John Creek. The southern part was worked from the camp on Willow Creek the men going to and returning from work in the car of the Chief of party.

III. Summary of Field Data Secured

Field information was taken on the basis of Ribes eradication types. These are areas representing growth conditions sufficiently uniform to enable the use of a given method of Ribes eradication as protection against blister rust. These eradication types are being used by the Office of Blister Rust Control in their experimental Ribes eradication work and are uniform for the entire Idaho white pine belt.

Types are as follows:

1. Dense mature (D.M.) a stand of timber 12" D.B.H. or over, which is fully stocked or nearly so, and generally, but not necessarily, contains little brush and few Ribes, except in openings or moist spots.

2. Open mature (O.M.) a stand of timber 12" D.B.H., or over, which is understocked, this condition generally resulting in the presence of brush and Ribes.

3. Dense pole (D.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is fully stocked or nearly so, and generally but not necessarily, contains little brush and few Ribes.

4. Open pole (O.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is understocked, this condition generally resulting in the presence of brush and Ribes.

5. Dense Reproduction (D.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are uniformly and thickly distributed over the ground. Brush and Ribes may or may not be present.

6. Open reproduction (O.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are unevenly distributed in patches over the ground, the intervening openings generally containing brush and Ribes if other conditions are favorable.

7. Stream type (St.) an area varying in width along a stream which due to the opening in the timber stand and presence of moisture, presents a favorable situation for the growth of Ribes and associated brush.

8. Brush (Br.) an area either cut or burned over, or of waste land, on which reproduction has not yet occurred but on which Ribes may occur contiguous to white pine type.

Summary of Areas Covered by Reconnaissance (Acres)

Table No. I.

White Pine Type

Eradication Type	Age Classes 11-20	21-40	41-60	61-80	81-100	101-200	200+	Not Timbered	Total
O.M.						9616	1809		11425
D.M.						570			570
O.P.				210		235			445
D.P.		110	920	15		275			1320
O.R.	190	8891	285	750					10116
D.R.	1905	1038	80						3023
Total	2095	10039	1285	975		10696	1809		26899
Non-White Pine Type									
O.M.					150	5070	629		5849
D.M.						200			200
O.P.		80	120	223	942	785			2150
D.P.			195	40					235
O.R.	130	845		125					1100
D.R.	236	70							306
Total	366	995	315	388	1092	6055	629		9840
Stream								336	
Brush								1127	
Meadow and Cultivated								2598	
Total								4061	4061
Grand Total	2461	11034	1600	1363	1092	16751	2436	4061	40800

In addition to this intensive work 9 sections or 5760 acres were worked extensively.

Ribes Conditions

Four species of Ribes were found as follows:

1. Wild black currant (*Ribes petiolare*), a moisture loving species growing in profusion along streams.

2. White stemmed gooseberry (*Ribes inerme*) similar in its requirements to wild black currant.

3. Prickly currant (*Ribes lacustre*), the least exacting species as to moisture and light and hence more widely distributed.

4. Sticky currant (*Ribes viscosissimum*), demands ample light but little moisture. Found on burns, in reproduction stands, and in poorly

stocked mature or pole stands.

Of the total area worked this year 6% contained no Ribes, 62% contained less than five to the acre, 96% contained not over 25 to the acre and only 8/10% had over 100 to the acre.

Experimental Ribes eradication was performed this year by the Office of Blister Rust Control on an area which had an average of more bushes per acre than is shown by reconnaissance on the Coeur d'Alene association. This eradication work was done at an average cost on all types of $1.26 per acre. It is therefore safe to assume that this cost represents a fair estimate of what this work could be done for on the Coeur d'Alene association since working conditions are quite comparable.

The following table shows the acreage of the various eradication types and the average Ribes per acre in each type.

Table No. II.

Table Showing Average Number of Ribes per Acre
Within Eradication Types

Eradication Type	Acres	Average per Acre
Dense Mature	770	1.9
Dense Pole	1555	2.83
Dense Reproduction	3329	.48
Open Mature	17274	4.85
Open Pole	2595	25.09
Open Reproduction	11216	23.59
Stream	336	236.72
Brush	1127	93.15
Meadow	2598	0
Totals & Averages	40800	14.34

IV. Cost of Reconnaissance

Money expended during the summer from July 1 to Sept. 15 as follows:

Federal $1241.13
Association..... 375.00
$1616.13

46,240 acres were covered by reconnaissance at a cost of 3 4/10 cents per acre.

V. Results of Scouting for Blister Rust

The members of the reconnaissance party were constantly on the lookout for blister rust in the course of the reconnaissance work and while travelling in or adjacent to the association. A special trip of intensive scouting for the disease was made after the reconnaissance work was terminated. Mr. Rodner, in charge, is familiar with the disease on both Ribes and pines. No blister rust was found on the association this summer.

VI. Location of Inspection Points

To aid and simplify future scouting for blister rust nine permanent inspection plots were located in different parts of the association. A careful record and description of these plots was taken and it is planned to visit these at regular intervals in the future in order to know when the disease has entered the association area.

Table No. III.

Financial Statement of Expenditures by the Coeur d'Alene Association and Office of Blister Rust Control Jan. 1, 1926 - Dec. 31, 1926.

	Association	Federal	Total
Office Work		$954.95	$954.95
Training Period	$5.00	233.20	238.20
Reconnaissance	$370.00	1241.13	1611.13
Scouting	75.00	186.73	261.73
Total	$450.00	$2616.01	$ 3066.01

BLISTER RUST CONTROL WORK ON LANDS OF PEND OREILLE TIMBER PROTECTIVE ASSOCIATION

Office of Blister Rust Control,
Bureau of Plant Industry,
and Pend Oreille Timber Protective Association
Cooperating

* *

Summer, 1926

* * *

Purpose of Work

The purpose of this work was three fold, as follows:

a. To survey the white pine lands in the association, (Control Reconnaissance) to determine;
   (1) The extent and distribution of the white pine type;
   (2) The extent and distribution of Ribes and factors influencing the cost of eradication.

b. To search for blister rust.

c. To establish inspection points representing locations favorable for blister rust infection on most susceptible currants and gooseberries (Ribes) in order to systematize and simplify future searchings for blister rust.

Results of Control Reconnaissance

Personnel

Reconnaissance was carried on by a party of three men under the general supervision of J. L. Bedwell with Harry F. Geil as chief of party and Guy V. Williams and Rene La Rocque as assistants.

Training Period

Before the regular reconnaissance work was started a training period of ten days, from June 21 to June 30, was spent at Coolin, Idaho, training the new men in the methods of reconnaissance.

Area Worked in 1926

a. Acreage:-Total number of acres worked 33,280
b. Percentage of association worked 3.8%
c. Ownership of land worked.

Federal Government	2,280
State of Idaho	1,960
County	600
Private	28,440

d. Location of areas.

McArthur - In this area seven (7) sections were worked in T. 60 N., R. 1 W.

Hellroaring Basin - Five (5) sections were worked in T. 59 N., R. 3 W. and T. 59 N., R. 2 W.

Caribou Basin - Eleven (11) sections were worked in T. 59 N., R. 2 W. and T. 59 N., R. 3 W.

Berry Creek Basin - Three (3) sections were worked in T. 59 N., R. 3 W.

Colburn Creek - Eight (8) sections were worked in T. 58 N., R. 2 W.

Sweitzer Basin - Ten (10) sections were worked in T. 58 N., R. 3 W.

Little Sand Creek - Eight (8) sections were worked in T. 57 N., R. 2 W. and T. 58 N., R. 2 W.

e. Accessibility of areas.

All of these areas are easily accessible by automobile and pack string. The longest distance to pack is about seven miles into Hellroaring Basin.

Summary of Data Secured

Field information taken on basis of Ribes eradication types. These are areas representing growth conditions sufficiently uniform to enable the use of a given method of Ribes eradication as protection against blister rust. The eradication types are being used by the Office of Blister Rust Control experimental Ribes eradication work and are uniform for the entire Idaho white pine belt. They are as follows:

1. Dense mature (D.M.) a stand of timber 12" D.B.H. or over, which is fully stocked or nearly so, and generally, but not necessarily, contains little brush and few Ribes, except in openings or moist spots.

2. Open mature (O.M.) a stand of timber 12" D.B.H., or over, which is understocked, this condition generally resulting in the presence of brush and Ribes.

3. Dense pole (D.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is fully stocked or nearly so, and generally but not necessarily, contains little brush and few Ribes.

4. Open pole (O.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is understocked, this condition generally resulting in the presence of brush and Ribes.

d. [illegible] of sections.

[illegible] – [illegible] ([illegible]) sections were worked in [illegible]

[illegible] Basin – [illegible] sections were worked in [illegible]

[illegible] Basin – [illegible] (11) sections were worked in [illegible]

[illegible] Creek Basin – [illegible] (5) sections were worked in [illegible]

[illegible] – Eight (8) sections were worked in [illegible]

[illegible] Basin – Ten (10) sections were worked in [illegible]

[illegible] Creek – Eight ([illegible]) sections were worked in [illegible]

e. Accessibility of areas.
All of these areas are easily accessible by automobile and pack [illegible]. The longest distance to pack is about seven miles into [illegible] Basin.

Summary of Data Secured

Field information taken on basis of [illegible] eradication types. These are areas apparently [illegible] conditions [illegible] the use of a given method [illegible] protection against [illegible] rust. The eradication types are those used by the office of blister rust control [illegible] for the entire Idaho white pine belt. These are as follows:

1. Dense mature (D.M.) a stand of timber 12" D.B.H. or over, which is fully stocked or nearly so, and [illegible], but not necessarily, containing little brush and few Ribes, except in openings or moist spots.

2. Open mature (O.M.) a stand of timber 12" D.B.H., or over, which is understocked, this condition generally resulting in the presence of brush and Ribes.

3. [illegible] pole ([illegible]) a stand in which the trees [illegible] from 4" to 12" D.B.H. which is fully stocked or nearly so, and [illegible] but not necessarily, contain little brush and few Ribes.

4. Open pole (O.P.) a stand in which [illegible] are [illegible] from 4" to 12" D.B.H. [illegible] understocked, this condition [illegible] resulting in the presence of brush and Ribes.

5. Dense reproduction (D.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are uniformly and thickly distributed over the ground. Brush and Ribes may or may not be present.

6. Open reproduction (O.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are unevenly distributed in patches, over the ground, the intervening openings generally containing brush and Ribes, if other conditions are favorable.

7. Stream type (St.) an area varying in width along a stream which, due to the opening in the timber stand and presence of moisture, presents a favorable situation for the growth of Ribes and associated brush.

8. Brush (Br.) an area either cut or burned over, or waste land, on which reproduction has not yet occurred, but on which Ribes may occur contiguous to white pine type.

Types and Age Class.

The following table shows the number of acres of white pine of the various age classes found in the different eradication types.

Table No. I.

Age Class

Types	1-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Total
D.M.						210	3883	3978	8071
D.P.				593	535				1128
D.R.	160	1218	1832						3210
O.M.							35	879	914
O.P.				365					365
O. R.		902	2170						3072
Total	160	2120	4002	958	535	210	3918	4857	11,760

Number of acres of non-white pine type of various age classes found in the different eradication types.

Table No. I. (Cont'd)

Types	Age Class I-10	11-20	21-40	41-60	61-80	81-100	101-200	200 +	Total
D.M.							430	2816	3246
D.F.			[illegible]	130					130
D.R.			210						210
O.M.			[illegible]	[illegible]		95	2344	4279	6718
O.P.				85		200			285
O.R.		235	705						940
Total		235	915	215		295	2774	7095	11,529
Non-timber									
Stream									240
Brush									2527
Burn									1642
Rock									552
Field									20
Total									4391
Grand Total	160	2555	4917	1173	536	505	6632	11958	33280

Ribes Conditions

Two species of Ribes were found as follows:

(1) Prickly currant (R. lacustre) the least exacting species as to moisture and light and hence more widely distributed.

(2) Sticky currant (R. viscossisimum) demands ample light and little moisture. Found on burns, in reproduction and in poorly stocked mature and pole stands.

Of the total area of 33,280 acres worked in 1926, 16,175 acres, or 48.5% contained no Ribes. Of the balance 4,201 acres, or 12½% of the total, contained not more than 10 Ribes per acre. Estimates based on experimental Ribes eradication performed this year by the Office of Blister Rust Control shows that of this 33,280 acres 20,376 acres could probably be worked by eradication crews for an average cost of .35¢ per acre. (Areas found free from Ribes by reconnaissance crews must be rapidly worked over to be sure that no small patches of these plants are missed). The balance of the area would represent a higher cost, depending upon working conditions, as expressed by the eradication types and by the number of Ribes per acre.

Table showing average number of Ribes per acre within the different eradication types.

Table No. II.

Eradication Type	Acres	Ribes per Acre
Dense Mature	11,317	16
Dense Pole	1,258	2
Dense Reproduction	3,420	51
Open Mature	7,332	48
Open Pole	650	0
Open Reproduction	4,012	66
Stream	240	163
Brush	2,537	8
New Burn	1,642	0
Rock	552	5
Fields	20	0
Totals & Averages	33,280	31

Cost of Reconnaissance

Reconnaissance work was carried on from July 1st to September 20th, 33,280 acres were reconnaissanced at a total cost of $942.53 or an average of $0.028 per acre.

Of this amount the Federal Government paid . . . $655.03
Association paid 287.50
$942.53

Result of Search for Blister Rust

During the season all employees were constantly on the watch for signs of blister rust but none was found.

Mr. Geil, in charge of the party, has been in the blister rust areas of British Columbia and is familiar with the disease.

Inspection Plots and Areas

To aid and simplify future scouting for blister rust several permanent inspection plots were located in different parts of the association. A careful record and description of these plots was taken and it is planned to inspect these at regular intervals in the future in order to know where the disease has entered the association area.

BLISTER RUST CONTROL WORK ON LANDS
OF THE POTLATCH TIMBER PROTECTIVE ASSOCIATION

Office of Blister Rust Control of the
Bureau of Plant Industry,
and Potlatch Timber Protective Association,
Cooperating.

* * *

Season of 1926.

* * *

I. Purpose of Work.

a. To survey the white pine lands in the Association (control reconnaissance) to determine (1) extent of white pine type in the Association, and (2) the location and number of currants and gooseberries per acre (average).

b. To search for blister rust.

c. To establish inspection plots for blister rust infections on most susceptible currants and gooseberries in order to systematize and simplify future searchings for blister rust.

II. Results of Control Reconnaissance.

Personnel:

Under the general supervision of Mr. J. L. Bedwell, Remley E. Myers acted as Chief of Party, with two assistants, Chas. C. Gregory and R. L. Davis.

Training:

Before starting actual field work a training camp for the personnel was maintained at Fernwood, Idaho, for the purpose of familiarizing the men with details of the work. This period lasted for 11 days.

Area worked in 1926:

a. 39,164 acres covered by reconnaissance.
b. 6% of the total area of the Potlatch Timber Protective Association worked.
c. Ownership status of areas worked:

*Federal (USGLO and other Departments of the Interior)..............	2,800 acres.
State of Idaho..........	6,240 acres.
**Private Ownership.......	30,134 acres.
Total	39,164 acres.

*Includes lands listed as "vacant" and "power sites."
**Includes lands listed as the property of the county in which it is located.

d. Location of areas worked.

Township 39 N., R. 5 E., Sections 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, and 36, comprising parts of the drainages of Swamp and Cranberry Creeks and tributaries in the vicinity of the Jericho Mine. Worked from McGanns Placer Diggings cabin.

Township 38 N., R. 3 E., Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, comprising parts of the drainages of Swamp and Cranberry Creeks as well as several small unnamed creeks draining into the North Fork of the Clearwater River between and adjacent to the above named creeks. Worked from Schills Cabin, Potlatch Timber Protective Association Smoke Chaser Cabin.

Township 38 N., R. 1 E., Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, comprising parts of the drainage of Dick's Creek and tributary streams. Worked from Mason Meadow Fire Patrol station.

Township 39 N., R. 3 E., Sections 19,20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, comprising parts of the drainages of Three Bear and Long Meadow Creeks. Area worked from camp at the junction of East and West Forks of Three Bear Creek.

e. Accessibility of areas.

Upper Swamp and Cranberry Creek drainages worked from McGanns Placer Diggings is reached by road that is passable for 3 or 4 months of the year from Elk River, Idaho. Supplies were hauled by truck to this camp. The distance from Elk River was 17 speedometer miles. The road from Elk River to the Jericho Mine Road is well graded but cut up by truck so badly as to make it a hard trip for passenger cars and made heavy loads impossible for any kind of car except a truck.

Lower Swamp and Cranberry Creek drainages worked from Schill's is on the same road but 4 miles southeast and is as accessible as McGanns'.

Dick's Creek in the vicinity of Mason Meadow Fire Patrol Station requires packing from Elk River, Idaho, but supplies could be brought in from Southwick, Idaho, a distance of 10 miles. Mason Meadow is 25 miles from Elk River by trail and about 90 around by road via Kendrick and Southwick. All supplies were packed by mules from Elk River, Idaho.

The camp on Three Bear Creek is reached in the same manner by trail but a road ends within about 4 miles of the camp site which is passable during the dry months of the year.

d. Location of areas worked.

Township 39 N., R. 5 E., Sections 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, and 36, comprising parts of the drainages of Swamp and Cranberry Creeks and tributaries in the vicinity of the Jericho Mine. Worked from McGanns Placer Diggings cabin.

Township 38 N., R. 5 E., Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, comprising parts of the drainages of Swamp and Cranberry Creeks as well as several small unnamed creeks draining into the North Fork of the Clearwater River between and adjacent to the above named creeks. Worked from Schills Cabin, Potlatch Timber Protective Association Smoke Chaser Cabin.

Township 38 N., R. 1 E., Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, comprising parts of the drainage of Dick's Creek and tributary streams. Worked from Mason Meadow Fire Patrol station.

Township 39 N., R. 3 E., Sections 19,20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, comprising parts of the drainages of Three Bear and Long Meadow Creeks. Area worked from camp at the junction of East and West Forks of Three Bear Creek.

e. Accessibility of areas.

Upper Swamp and Cranberry Creek drainages worked from McGanns Placer Diggings is reached by road that is passable for 3 or 4 months of the year from Elk River, Idaho. Supplies were hauled by truck to this camp. The distance from Elk River was 17 speedometer miles. The road from Elk River to the Jericho Mine Road is well graded but cut up by truck so badly as to make it a hard trip for passenger cars and made heavy loads impossible for any kind of car except a truck.

Lower Swamp and Cranberry Creek drainages worked from Schill's is on the same road but 4 miles southeast and is as accessible as McGanns'.

Dick's Creek in the vicinity of Mason Meadow Fire Patrol Station requires packing from Elk River, Idaho, but supplies could be brought in from Southwick, Idaho, a distance of 10 miles. Mason Meadow is 25 miles from Elk River by trail and about 90 around by road via Kendrick and Southwick. All supplies were packed by mules from Elk River, Idaho.

The camp on Three Bear Creek is reached in the same manner by trail but a road ends within about 4 miles of the camp site which is passable during the dry months of the year.

None of the areas worked during the season of 1926 could be classed as accessible in the sense that they are close to the source of supplies. Elk River is the headquarters of the Potlatch Timber Protective Association and it is advantageous to purchase supplies from them at wholesale prices rather than from other stores. The first two areas are more accessible to Elk River than to any other town.

Percent of Area Covered to Date

Total area of association	705,261 acres.
Area worked 1924	6,204 acres.
Area worked 1925	3,920 acres.
Area worked 1926	39,164 acres.
Total	49,288 acres.

Percent of area worked in 1924-25	2%.
Percent of area worked in 1926	6%.
Total area worked to date	8%.

III. Summary of Data Secured

Field information taken on basis of Ribes eradication types. These types are areas representing growth conditions sufficiently uniform to enable the use of a given method of Ribes eradication as protection against blister rust. These eradication types are used by the Office of Blister Rust Control in their experimental eradication work and are uniform for the entire Idaho white pine region.

They are as follows:

1. Dense mature (D.M.) a stand of timber 12" D.B.H. or over, which is fully stocked or nearly so, and generally, but not necessarily, contains little brush and few Ribes, except in openings or moist places.

2. Open mature (O.M.) a stand of timber 12" D.B.H., or over, which is understocked, this condition generally resulting in the presence of brush and Ribes.

3. Dense pole (D.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is fully stocked or nearly so, and generally but not necessarily, contains little brush and few Ribes.

4. Open pole (O.P.) a stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is understocked, this condition generally resulting in the presence of brush and Ribes.

5. Dense reproduction (D.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are uniformly and thickly distributed over the ground. Brush and Ribes may or may not be present, depending on the size of the reproduction.

6. Open reproduction (O.R.) a stand in which the trees are predominantly less than 6" D.B.H., and are unevenly distributed in patches, over the ground, the intervening openings generally containing brush and Ribes, if other conditions are favorable.

7. Stream type (St.) an area varying in width along a stream which, due to the openings in the timber stand, presence of moisture, presents a favorable situation for the growth of Ribes and associated brush.

8. Brush (Br.) an area either cut or burned over or of waste land on which reproduction has not yet occurred but on which Ribes may occur contiguous to white pine area.

Summary of Reconnaissance by Timber Type and Age Classes

Table No. I.

Timber Type and Age Class Table
by
Eradication Type and Age Class

White Pine Type

Eradication Types	Age Classes								Not Timbered	Total
	1-10	11-20	21-40	41-60	61-80	81-100	101-200	200+		
O.M.						899	5591	5983		12473
D.M.						233	5149	905		6287
O.P.			120	235						355
D.P.			60	105	87					252
O.R.	619	1545	842							3006
D.R.	120									120
Total	739	1545	1022	340	87	1132	10740	6888		22493
Non-white Pine Type										
O.M.						310	8617	3841		12768
D.M.							1618	195		1813
O.P.				80	30					110
D.P.				22	78					100
O.R.		315	120							435
D.R.										
Total		315	120	102	108	310	10235	4036		15226
Stream									76	76
Brush									1244	1244
Rock									114	114
Meadow & Cleared									11	11
Total									1445	1445
Grand Total	739	1860	1142	442	195	1442	20975	10924	1445	39164

<u>Summary of Reconnaissance by Timber Type and Age Classes</u>

Table No. I.

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by
Eradication Type and Age Class

White Pine Type

Eradi-cation Types	Age Classes 1-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Not Timbered	Total
O.M.						[illegible]	5591	5983		12473
D.M.						233	5149	905		6287
O.P.			120	235						355
D.P.			60	105	87					252
O.R.	519	1545	842							[illegible]
D.R.	120									120
Total	759	1545	1022	340	87	1132	10740	[illegible]		22436

Non-white Pine Type

Eradi-cation Types	1-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Not Timbered	Total
O.M.						310	8617	3841		12768
D.M.							[illegible]	195		[illegible]
O.P.				80	30					110
D.P.				22	78					100
O.R.		315	120							[illegible]
D.R.										
Total		315	120	102	108	310	10235	4036		15226

	1-10	11-20	21-40	41-60	61-80	81-100	101-200	200+	Not Timbered	Total
Stream									76	76
Brush									1244	1244
Rock									114	114
Meadow Cleared									11	11
Total									1445	1445
Grand Total	739	1860	1142	442	195	1442	20975	10924	1445	39164

Ribes Conditions

Three species of Ribes were found:

1. Prickly currant (R. lacustre) the least exacting species as to moisture and light and hence most widely distributed.

2. Sticky currant (R. viscosissimum) demands ample light but little moisture. Found on burns, in reproduction and in poorly stocked mature or pole stands.

3. Inland black gooseberry (G. irrigua) of secondary importance. Seldom found.

Of the total area of 26,534 acres covered by intensive reconnaissance 17,302 acres, or 66%, contained no Ribes. Of the balance, 4,665 acres, or 18% contained not more than 10 Ribes per acre. Experimental Ribes eradication performed this year by the Office of Blister Rust Control shows that of this 26,534 acres, 21,967 acres could be eradicated for an average cost of about 35¢ per acre. (Areas found free of Ribes by reconnaissance crews must be rapidly worked over to be sure that no small patches of these plants are missed). The balance of the area would represent a higher cost per acre depending upon working conditions, as expressed by the eradication types and by the number of Ribes per acre.

The following table shows the acreages of the various eradication types and the average number of Ribes per acre.

Table No. II.

Eradication Type	Acres	Average No. Ribes per A.
O.M.	25,241	6
D.M.	8,100	0
O.P.	465	0
D.P.	352	0
O.R.	3,441	16
D.R.	120	0
Stream	76	136
Brush	1,244	10
Rock	114	12
Meadow & Cleared	11	0
Total & Average	39,164	6

<u>Ribes Conditions</u>

Three species of Ribes were found:

1. Prickly current (*R. lacustre*) the least exacting species as to moisture and light and hence most widely distributed.

2. Sticky currant (*R. viscosissimum*) demands ample light but little moisture. Found on burns, in reproduction and in poorly stocked mature or pole stands.

3. Inland black gooseberry (*G. irrigua*) of secondary importance. Seldom found.

Of the total area of 25,534 acres covered by intensive reconnaissance 17,302 acres, or 68%, contained no Ribes. Of the balance, 4,565 acres, or 18% contained not more than 10 Ribes per acre. Experimental Ribes eradication performed this year by the Office of Blister Rust Control shows that of this 25,534 acres, 21,967 acres could be eradicated for an average cost of about 35¢ per acre. (Areas found free of Ribes by reconnaissance crews must be rapidly worked over to be sure that no small patches of these plants are missed). The balance of the area would represent a higher cost per acre depending upon working conditions, as expressed by the eradication types and by the number of Ribes per acre.

The following table shows the acreages of the various eradication types and the average number of Ribes per acre.

Table No. II.

Eradication Type	Acres	Average No. Ribes per A.
O.M.	25,241	5
D.M.	8,100	0
C.P.	465	0
D.P.	352	0
C.R.	3,441	15
D.R.	120	[illegible]
Stream	76	155
Brush	1,244	10
Rock	114	[illegible]
Meadow & Cleared	11	0
Total & Average	39,164	6

Cost of Reconnaissance

Money expended during the summer from July 1 to Sept. 15, as follows:

Federal. . . .	$789.60
Association .	312.50
	$1102.10

39,164 acres were covered by reconnaissance at a cost of 2 8/10 cents per acre.

Fire Cooperation

The reconnaissance crew spent three days assisting in the suppression of a fire near Schills' Cabin Aug. 7 - 9. They only missed two working days on reconnaissance, however. No other calls were made on them during the summer.

REPORT OF RECONNAISSANCE FOR THE CONTROL OF
BLISTER RUST ON THE LANDS OF THE PRIEST
LAKE TIMBER PROTECTIVE ASSOCIATION

Office of Blister Rust Control,
Bureau of Plant Industry,
and the Priest Lake Timber Protective
Association Cooperating

* *

Season 1926

* * *

1. Purpose of Control Reconnaissance

This work was carried on with the purpose of gathering data relative to the factors of cost in eradication of currants and gooseberries (Ribes) from timber stands containing white pine; to make a systematic survey of the timbered areas; to locate the areas most easily infected and to determine if the disease were already present.

2. Training of Personnel

A field supervisor, chief of party, and five temporary assistants constituted the personnel. A training camp was established at Coolin, Idaho, for instruction of the temporary men of this and the Pend Orielle Association. This training period was established on June 21 and instruction was given until July 1, a period of ten days. The men were thoroughly instructed in the method of gathering and compiling the data. One system was employed for the work on all associations thus insuring a basis for comparison of results at the close of the season.

3. Summary of Data Secured

Field information taken on basis of Ribes Eradication Types. These are areas representing growth conditions sufficiently uniform to enable the use of a given method of Ribes eradication as protection against blister rust. The eradication types are being used by the Office of Blister Rust Control experimental Ribes Eradication work and are uniform for the entire Idaho white pine belt. They are as follows:

1. Dense Mature (D.M.) A stand of timber 12" D.B.H. or over which is fully stocked or nearly so, and generally, but not necessarily contains little brush and few Ribes except in openings or moist places.

2. Open Mature (O.M.) A timber stand over 12" D.B.H. which is understocked. This condition generally results in the presence of brush and Ribes.

3. Dense Pole (D.P.) A stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. which is fully stocked or nearly so

Summary of Reconnaissance by Timber Types and Age Classes

Table showing number of acres in each eradication type:

Table No. I.

White Pine Type

Eradication Type	Age Classes 11-20	21-40	41-60	61-80	81-100	101-200	200+	Not Timbered	Total
OM.					285	2816	505		3606
DM.					1445	6052	180		7677
OP.		190	80	1135	708				2113
DP.		360	465	655					1480
OR.	2929		40						2969
DR.	1991	620	220						2831
Total	4920	1170	805	1790	2438	8868	685		20676
Non-White Pine Type									
OM.					1150	4525	920		6595
DM.					155	50	240		445
OP.		1705	980	1792	80				4557
DP.	30	100	515						645
OR.	1935								1935
DR.	1095			125					1220
Total	3060	1805	1495	1917	1385	4575	1160		15397
Stream								542	542
Meadow								457	457
Brush								678	678
Barren								195	195
Total								1872	1872
Grand Total	7980	2975	2300	3707	3823	13443	1845	1872	37945

Ribes Conditions

Three species of Ribes were found.

1. Prickly currant (Ribes lacustre) was found widely distributed. This species makes few demands regarding light or moisture and thrives under a wide diversity of conditions.

2. Sticky currant (Ribes viscosissimum) demands ample light but does not require much moisture, hence, this species was found thickly distributed on most burns and reproduction areas.

3. White stemmed gooseberry (Grossularia inermis). This has a relatively small range and seems to be confined to the streams adjacent to Priest Lake. This species demands light and moisture.

The following table shows the acreages of the various eradication types and the average number of Ribes per acre.

and generally contains little brush and few Ribes.

4. Open Pole (O.P) A stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. but which is understocked, this condition usually results in the presence of brush and Ribes.

5. Dense Reproduction (D.R.) A stand in which the trees are predominantly less than 6" D. B. H. and are uniformly and thickly distributed over the ground, brush and Ribes may or may not be present.

6. Open Reproduction (O.R.) A stand in which the trees are predominantly less than 6" D.B.H. and are unevenly distributed in patches over the ground. These areas contain brush and Ribes if conditions are favorable.

7. Stream Type (St.) An area varying in width along a stream which, due to openings in the stand and presence of moisture, offer ideal conditions for the growth of Ribes and brush.

8. Brush (Br.) A slashing or burned area or wasteland on which reproduction has not occurred, but on which Ribes may occur contiguous to white pine stands.

4. Area Worked

A. 37,945 acres were covered by intensive reconnaissance during the summer of 1926.
B. 16% of association covered in 1926
C. Ownership status

State of Idaho	84% or 31,540 acres.
Private	16% or 6,405 acres.

5. Location of Areas

The work was carried on from three base camps located on Hunt Creek, Soldier Creek and at Coolin, Idaho. Camp sites were chosen with reference to accessibility and at points central to areas to be worked. Coolin, Idaho was used as headquarters and supplies were conveyed to the camps by pack horse.

6. Accessibility of Areas

Fair pack horse trails are present in all the main drainages on the area and it is possible to reach any of the camps by pack horse in one day's travel. The main Coolin road was used for auto transportation of men and supplies when the outfit was camped at Coolin, Idaho. As roads do not continue above Cavanaugh Bay, or into any of the drainages on this area, pack horses are the usual mode of transportation.

and generally contains little brush and few Ribes.

4. Open Pole (O.P) A stand in which the trees next to be cut are predominantly 6" to 12" D.B.H. but which is understocked, this condition usually results in the presence of brush and Ribes.

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7. Stream Type (St.) An area varying in width along a stream which, due to openings in the stand and presence of moisture, offer ideal conditions for the growth of Ribes and brush.

8. Brush (Br.) A slashing or burned area or wasteland on which reproduction has not occurred, but on which Ribes may occur contiguous to white pine stands.

4. Area Worked

A. 37,945 acres were covered by intensive reconnaissance during the summer of 1926.

B. 15% of association covered in 1926

C. Ownership status

State of Idaho	84% or 31,540 acres.
Private	16% or 6,405 acres.

5. Location of Areas

The work was carried on from three base camps located on Hunt Creek, Soldier Creek and at Coolin, Idaho. Camp sites were chosen with reference to accessibility and at points central to areas to be worked. Coolin, Idaho was used as headquarters and supplies were conveyed to the camps by pack horse.

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Fair pack horse trails are present in all the main drainages on the area and it is possible to reach any of the camps by pack horse in one day's travel. The main Coolin road was used for auto transportation of men and supplies when the outfit was camped at Coolin, Idaho. As roads do not continue above Cavanaugh Bay, or into any of the drainages on this area, pack horses are the usual mode of transportation.

Table No. II.

Eradication Type	Acres	Average Number of Ribes per Acre
O. M.	8971	18
D. M.	7507	6
O. P.	7825	10
D. P.	2800	2
O. R.	5524	77
D. R.	3446	18
Stream	542	193
Brush	678	1
Meadow	457	0
Barren	195	0
Total and Average	37945	23

7. Cost of Reconnaissance

$928.73 was spent by the Federal Government for this work. The cost per acre averages $0.0244.

8. Fire Cooperation

The reconnaissance crew was called on July 15th to fight fires on association lands on Indian Creek and was continuously on these fires until the 20th of August. A total of 27 crew days or 222 man days were spent on fire suppression out of a total of 73 crew days spent in the field. Thus approximately 50% of the field season was spent fighting fire. This naturally curtailed the reconnaissance work and ran the cost of the work done higher than necessary but the emergency which existed left no other alternative.

SCOUTING FOR WHITE PINE BLISTER RUST IN NORTH IDAHO.
SEPTEMBER, 1926.

by

W. A. Rockie
Assistant Pathologist.

During the period from September 15 to September 30, 1926, intensive scouting for blister rust was carried on in Boundary, Bonner and Kootenai counties, in northern Idaho.

Most of the scouting was done on or near the highways, at points readily accessible and easily located in succeeding years.

Scouting was chiefly within Boundary and Bonner counties, with but a few inspection stations in Kootenai county.

No infection was found in any part of the area covered by this period of scouting.

The detailed inspection record is briefly summarized as follows:

County	No. of Inspection Points	Average distance Between Inspection Points (Miles)	Ribes Inspected											
			Native Species						Cultivated Species					Total
			R. lac.	R. vis.	R. pet.	G. iner.	G. irrig.	Total	R. nig.	R. odora.	R. vulg.	R. recli.	Total	
Boundary	19	4.4	100	1		31		132	1	4	93	114	212	344
Bonner	68	5.5	103	87		224		414	1	7	155	62	225	639
Kootenai	7	6.2	5	10		11	3	29			8		8	37
Totals	94		208	98		266	3	575	2	11	256	176	445	1020
Average per Inspection Point		5.3						6.1					4.7	10.9

BLISTER RUST CONTROL WORK IN WASHINGTON
1926

Blister rust control work in Washington during 1926 has consisted of cultivated black currant eradication and scouting for the disease. The scouting in the western portion of the state has largely been confined to searching for pine infection; that in the eastern part of the state to inspection of Ribes at numerous points for indications of the disease. Mr. G. A. Felch, Agent, has been in charge of the cultivated black currant eradication work and has also performed most of the scouting in eastern Washington. The scouting in western Washington was done under the supervision of Mr. L. N. Goodding, Assistant Pathologist, State Leader for Oregon; the report on that work has been prepared by him.

The work in Washington has been organized under the memorandum of understanding which is given below; during 1926 Mr. Felch has been headquartered at Spokane, the location of the Western office:

MEMORANDUM OF UNDERSTANDING BETWEEN THE WASHINGTON STATE DEPARTMENT OF AGRICULTURE AND THE BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN WASHINGTON.

EFFECTIVE MAY 1, 1926 to JUNE 30, 1927.

For the purpose of effectively controlling the white pine blister rust in Washington, the several cooperating agencies shall participate in a joint program of action as follows:

1. The Bureau of Plant Industry shall pay the salaries and expenses of one or more men who shall perform necessary scouting for the disease in Washington. The Washington State Department of Agriculture shall deputize these scouts to enable them to enter and inspect any property and under the authority and direction of the Washington State Department of Agriculture to locate and secure the general destruction of cultivated black currant plants in Washington. These men shall also destroy host plants diseased with or exposed to infection from white pine blister rust, as directed by the Washington State Department of Agriculture.

2. The Washington State Department of Agriculture and the Bureau of Plant Industry shall cooperate with the Federal Horticultural Board in inspection for the purpose of aiding in the enforcement of State and Federal blister rust quarantines now in effect or which may be promulgated. The Bureau of Plant Industry shall pay the salaries and expenses and direct the work of one or more men who shall during the proper season inspect for violations of the Federal blister rust quarantines in the State of Washington. These men shall also cooperate with the Washington State Department of Agriculture in enforcing State quarantines. For this purpose they shall receive

instructions, in writing, in methods of procedure from the Washington State Department of Agriculture and shall be deputized to destroy plants shipped in violation of state quarantines.

3. The Washington State Department of Agriculture and its cooperators shall use their regular employees, so far as their other duties permit, in systematically locating and destroying cultivated black currants and infected or potentially infected blister rust host plants; in scouting for the blister rust; in inspecting nurseries for this disease and in enforcing State and Federal blister rust quarantines.

4. All official records showing work performed under this agreement shall be open to inspection of the Washington State Department of Agriculture or the Bureau of Plant Industry on request. All findings of the blister rust made by either the Washington State Department of Agriculture or the Bureau of Plant Industry shall be promptly reported to the other cooperating party. All specimens collected or received by the Washington State Department of Agriculture and their cooperators which are suspected to be infected with blister rust shall be submitted to the Bureau of Plant Industry for critical determination. The Bureau of Plant Industry shall give such technical information to the employees of the Washington State Department of Agriculture and its cooperators as will enable them to recognize the several stages of the disease. The results of cooperative work may be published simultaneously by the cooperating parties, or, subject to mutual agreement in each case, by either cooperating party. All manuscripts pertaining to this cooperative work shall be criticised by the cooperating parties before publication. All form letters, bulletins and any other circular matter to be mailed in penalty envelopes shall be submitted in manuscript form for approval by the United States Department of Agriculture before being printed or sent out.

5. It is understood that the Bureau of Plant Industry shall be primarily responsible for scouting and location of the blister rust in Washington and for technical information on its control, but that the Federal Government has no authority to destroy private or state property and therefore the Washington State Department of Agriculture shall be wholly responsible for the destruction of such pine, currant and gooseberry plants as may be found necessary in order to control the spread of this disease in Washington, including plants shipped in violation of State and Federal blister rust quarantine regulations.

6. It is provided that from May 1, 1926 to June 30, 1927, inclusive, the Washington State Department of Agriculture and its

cooperators will expend about $8000.00 and the Bureau of Plant Industry about $8000.00 in connection with the work specified. All expenditures made by the Bureau of Plant Industry shall be made in accordance with the fiscal regulations of the United States Department of Agriculture.

7. This memorandum of understanding shall take effect May 1, 1926 and continue in force until June 30, 1927, or until previously terminated by mutual consent of the parties concerned.

Date	Signatures
4/17/26	(s.) Erle J. Barne. Director, Washington State Department of Agriculture.
April 30, 1926	(s.) Wm A. Taylor Chief, Bureau of Plant Industry.

REPORT OF BLACK CURRANT ERADICATION

Washington

by

G. A. Felch - Agent

* * * *

From the 1st of July to the 5th of September the work was carried on by four men and the supervisor; from September 5 to 14, by two men and the supervisor; and the remainder of the month by two men alone.

The results of the summer's work are as follows:

County	Eradicated Plantings	Eradicated Plants
Walla Walla	16	75
Benton	26	95
Klickitat	7	27
Yakima*	74	218
Totals	123	415

* Approximately 75% scouted.

One planting consisting of one plant was eradicated in Spokane County as a recheck.

One planting of two bushes found but not eradicated (owner could not be found). No difficulty was experienced in receiving voluntary release of bushes.

Rechecking

A little work was done during the eradication period and later to determine the probable percentage of sprouting, and of missed plantings. Of thirteen eradicated plantings with 126 bushes inspected, 12 bushes in 3 plantings had sprouted, or $9\frac{1}{2}$%. The number of inspections were too few to draw any definite conclusions, but there is some evidence to show that eradication should be done with greater care, and that owners should be so well sold on the proposition that they will pull up any chance sprouts.

While examining eradicated plantings and during scouting for the disease, 4 missed plantings with 5 bushes were found in counties previously eradicated.

Method of Operating

The county was the unit worked at one time. The county was usually divided in half and two men with a car assigned to each half. County engineers' maps were generally used except in the Yakima Valley, where in addition a privately made ownership map was used. Each crew was to scout every farm and city home in its territory before leaving.

Never more than two men worked together, and some of the thinly settled regions were scouted by one man alone. Usually each two-man crew was located in or near different towns, but when feasible, they got together over the week-end. This gave an opportunity to talk over difficulties and for one crew to benefit from the experiences of the other. It also helped to build up a good spirit.

As a matter of policy, several methods of checking on the work of the crew were used. It was the practice to locate a few plantings ahead of the crews and then see if they found them. Occasionally some re-scouting was done by the supervisor to look for missed locations, and to get the impression left by the crews.

Two missed plantings were found. In both cases the scouts had been definitely told that there were no black currant bushes there. It is quite certain that that happens occasionally, because on the majority of places the owner's word must be accepted. It is impractical to scout every place thoroughly.

It was a rule that every farm scouted be located on the map by a dot, and then these dots were counted and checked with the U.S. Census figures for that county. Making allowances for abandoned farms and other factors, the figures agreed quite closely. This method tends toward greater efficiency in scouting, makes it possible to compare the work of one crew with another, and furnishes a basis for estimating other counties.

The speedometer readings of the cars were taken when the work started so that a check could be made on the scout's report of miles traveled.

Each two-man crew was equipped with a simple camp outfit which made it possible for them to stay near their work when no hotels were near or suitable.

On the whole the crew did very well. Their work was carefully done, and a good impression was left with the people.

Some data on Black Currant Eradication:

Average number of bushes per planting	$3\frac{1}{2}$
Miles of auto travel for each bush found	29
Miles of auto travel for each planting found . . .	98
Number of places scouted for each planting found .	161
Miles of auot travel for each place scouted. . . .	0.64
Total number of places scouted-towns 7,926 Farms 10,926	-18,852
Total number of miles traveled	12,066
Cost per planting eradicated	$28.00
Cost per bush eradicated.	8.30
Cost per place scouted	.18
Total cost of eradication	$3445.08

Total cost of eradication distributed as follows:

Name	Salary	Expense	Period	Total
G. A. Felch	$150.00	$215.00*	$2\frac{1}{2}$ Months	$902.67
J. G. McMacken	110.00	190.10*	2 Mo. 8 days	669.75
B. A. Ganoung	90.00	212.92*	3 Months	908.76
H. E. Whidden	90.00	90.00	2 Mo. 5 days	391.50
G. N. Jones	90.00	90.00	2 Mo. 28 "	535.50
Equipment				36.90
Total Cost of Eradication				$3445.08

*Includes mileage on personally owned car.

Cooperation

The great majority of people talked with knew something about Blister Rust, and were willing to co-operate. In a few instances owners destroyed their bushes before the scouts arrived. The attitude was largely the result of publicity and educational work. In no case was any compulsion used to secure eradication.

The newspapers were always willing to run Blister Rust articles, often giving space on the front page, and in some cases printing a good editorial.

Good cooperation was received from city, county, state and federal agencies. Assistance or offers of it were received from city engineers, city clerks, county engineers, county assessors, Forest Service, Indian Agency, and the Reclamation Service.

Publicity

It was the practice to run blister rust articles in all the local papers where work was being done, posters were put up in many places, a box window exhibit was in use most of the time, bulletins were handed out, and the film "Blister Rust - A Menace to Western Timber" was shown in 11 towns to 3, 115 people.

Letters have been mailed to all owners who have had black currants removed thanking them for their cooperation, asking them to report any black currants remaining in their locality and to pull any sprouts that come up. These letters should increase good will and secure the destruction of some sprouts.

Until the supply was exhausted, circular No. 226 "White Pine Blister Rust in the Western United States", was given to all owners who had currants removed and to anyone interested. Later Farmers' Bulletin No. 1398 "Currants and Gooseberries, Their Culture and Relation to White Pine Blister Rust" was used, but it was not as suitable as circular No. 226.

Judging by the number of people who had read or seen something about Blister Rust, and their willingness to cooperate, the publicity was well worth while.

Data on Yakima Valley Water Shed in Yakima County

During the time of eradication a little information was gathered on the white and white bark pine growing on the east slope of the Cascade Mountains in Yakima County on the water shed that supplies a part of the Yakima Valley irrigation water.

According to Mr. Lynch, a ranger of the Indian Forest Service, located at Signal Peak Ranger Station, a cruise of the entire Yakima Indian Reservation shows one million feet of white pine. This is mostly scattered young trees growing at about 4,300 feet elevation with yellow pine, fir, and tamarack with occasional spruce and hemlock. It is more general on north slopes, but usually forms less than 1% of the stand. There is also said to be some white bark pine on the high ridges.

In the northwestern corner of Yakima County, Harry Croxford, District Ranger at the Currant Flats Ranger Station, reports a few scattering white pine at about 4,300 feet elevation, particularly on north slopes and along streams. There is reported to be some white bark pine on the high ridges.

It was the opinion of Forest Service men, Irrigation Service men and others that the white pine in Yakima County is of no present commercial value, and that there is not enough white and white bark pine on the water shed to be of importance in conservation of water.

Recommendations

1. Two bulletins needed. At present there is no bulletin applying to western conditions suitable for general distribution. Such a bulletin should be brief, non-technical and have colored illustrations. In addition there should be a more complete semi-technical bulletin for distribution to Forest Service men and others who are particularly interested.

2. New Film. The film "Blister Rust - A Menace to Western Timber" is too long to be shown at the regular moving picture shows. A film of not more than 1000 feet showing more of the disease and less of the lumber industry would be better.

3. Slide Projector. For window display in towns in which black currant eradication is being done, and for educational work at fairs and similar gatherings, a slide projector that will automatically run through a series of slides is needed. Such a machine with the slides and daylight screen now in the office would be very effective.

A suitable second hand machine was offered by the Brayco Company of Washington, 1924 Third Ave., Seattle, Washington, for $50.00. A new and more up to date machine was offered by John W. Graham & Co., in Spokane for $180.00.

1927 Eradication Program

The following areas in Washington remain to be scouted: City of Spokane, approximately 29% of Yakima County, and all of Kittitas and Chelan counties. To complete the eradication in 1927 seven men with four cars would be required. Time and estimated cost as follows:

Name	Salary	Expense	Period	Total
G. A. Felch	$175.00	*$200.00	3 Months	$1,125.00
J. G. McMacken	115.00	* 200.00	3 Months	945.00
B. A. Ganoung	100.00	* 200.00	3 Months	900.00
G. N. Jones	100.00	* 200.00	3 Months	900.00
H. E. Whidden	100.00	75.00	3 Months	525.00
G. M. Roy	90.00	75.00	3 Months	495.00
H. A. Brown	90.00	75.00	3 Months	495.00
Total Field Cost of Eradication				$5,385.00

*Includes mileage on personally owned car.

$3.00 per diem is the usual expense but since two or three weeks will be spent in Spokane the average expense for these men will be about $75.00 per month.

All but the last two men have been previously employed and found very satisfactory. The last two are new and others may be found who are better qualified than they.

REPORT OF SCOUTING IN NORTHEASTERN WASHINGTON
SEPTEMBER 15 to 30, 1926
by
G. A. Felch, Agent.

* * * *

I. Introduction

Owing to the fact that blister rust was discovered in southeastern British Columbia in 1922 and is known to be now well established in the vicinity of Nelson, only 30 miles north of the border, yearly scouting trips have been made in the fall since 1922 in northeastern Washington. The purpose of this scouting was to determine whether or not blister rust had reached the white pine belt of northeastern Washington.

This report covers the scouting performed in northeastern Washington in September, 1926.

It is well at this point to state briefly the results of scouting previous to 1926. In the fall of 1923, Ribes infection was found on 62 black currants and 1 red currant. These infected Ribes were found in 9 plantings near the Canadian line, 8 of which were in Okanogan County, and 1 in Ferry County. The 1 infected red currant was touching an infected black currant. No infection has been found since in northeastern Washington. Fortunately, no white pines occurred near enough to the infected Ribes to receive the disease.

II. Scouting in Northeastern Washington, September, 1926

A. Area Scouted.

From September 15 to 30, 1926, a scouting trip was made by Felch and Simcoe in the former's personally owned auto. Points in Pend Oreille, Stevens and Ferry counties and in British Columbia along the boundary line were scouted.

B. Method of Scouting.

In scouting, all species of Ribes found were examined for blister rust. A special effort was made to find and inspect cultivated black currants. All R. petiolare found were carefully located and inspected. No pines were examined, since the disease was not found on Ribes. Time is poorly spent in examining pines for the rust in the fall unless Ribes are found infected in the vicinity.

All roads traversed during the scouting trip were marked with red on the county maps. Each location of Ribes inspected was written up and given a number and this number located as accurately as possible on the proper county map. If this is done each year the result will constitute a valuable record of Ribes distribution as well as an excellent guide for future scouting.

C. Results of Scouting, Northeastern Washington.

Table No. I gives the location of inspection points, and the number of each Ribes species inspected. No blister rust was found.

County	Location	Loc. No.	R. nig.	Cultivated Gooseberries	Cultivated Red Currants	R. pet.	G. iner.	R. visc.	R. lac.	R. aur.	Total Ribes	Situation and Notes
				Number of Ribes Inspected								
Pend Oreille	Shulomsky, Metaline Falls, Wash.	1	2								2	Owner would like to remove bushes to make room for other things.
"	6 miles N. of Metaline Falls, Wash.	2						9			9	In open, along roadside.
"	Slate Creek, 7 miles N. of Metaline Falls	3						2	17		19	In creek bottom and damp slope
"	10 miles N. of Metaline Falls	4							14		14	
"	11 miles N. of Metaline Falls	5						12	2		14	R. lacustre edge of pond R. visc. along road
"	12 miles N. of Metaline Falls	6							12		12	Stream
"	Sullivan Lake Ranger Sta. Wash.	7						4	4		8	Stream and damp slope
"	2 miles N. of Sullivan Lake Ranger Sta.	8							15		15	In swamp
"	3 miles N. of Sullivan Lake Ranger Sta.	9							4		4	On stream
"	Sweet Creek	10							11		11	On Stream
"	6 miles S. of Metaline Falls	11		4	3						7	East slope to river
"	7 miles S. of Metaline Falls	12						3			3	Shade and moist location
"	South end of Sullivan Lake	12A					2		35		37	Moist shade between stream and road
"	3 miles south of Sullivan Lake	13							17		17	Open rock slide
"	5 miles south of Sullivan Lake	14		5	12			4	3		24	Open field
"	2 miles E. of Ione, Wash.	15		10	21			3			34	Open field
"	6 miles W. of Ione on Ione Valley Road	16						13			13	Open south slope
"	5 miles W. of Ione on Ione Valley Road	17						7			7	In open along road
"	4 miles W. of Tiger, Wash.	18							2		2	On stream
"	3 miles W. of Tiger, Wash.	19						6			6	In open
"	2 miles S. of Ione	20					8				8	In swamp east of road
"	5 miles W. of Ione on Ione-Aladdin Road	21							9		9	On stream
"	7 miles W. of Ione on " " "	22						14	3		17	Open, along road
"	9 miles W. of Ione on " " "	23						3	3		6	In open, along road
"	12 miles W. of Ione on " " "	24					2		6		6	On stream
Stevens	Aladdin-Spirit Road 7 miles N. of Aladdin	25					2		3		5	On stream flowing N.
"	3 miles S. of Northport 1/2 mile up Onion Creek Road	26				3					3	On stream flowing N.
"	6 miles up Onion Creek Road	27					6		2		8	Swamp S. exposure
"	T.38 N - R.39 E.Sect.12	28				12	3				15	Stream and swamps flowing N.
"	6 miles N. of Northport on Northport-Rossland, B. C. Road	30							2		2	Stream
"	7 miles N. of Northport on road to Rossland	31					3				3	In swamp
"	T.38 N - R. 39 E. Sect. 1	29					5				5	Stream flowing N.
B. C.	Canadian Customs on Rossland Road	32	8								8	Dry orchard.Open to N.and S.
Stevens	Sect. 9 T.40N - R 39 E. N.of Northport	33							10		10	On stream
"	Sect.18 T.40N - R 39 E. Sheep Creek Bridge	34					3				3	Swamp
"	Sect.19 T.40N - R 38 E 8 miles W. of Sheep Creek Bridge	35						8			8	N. slope shade and moisture
"	1 mile W. of 1/4 corner Sect. 15 & 22 T. 40 N - R 38 E	36						2			2	Dry draw
"	Sept. 6 T. 39 N - R 38 E Flat Creek	37				5					5	Swampy conditions
"	Sect. 27 T 40 N - R 39 E 2 miles E of creek crossing on new federal road	38						3			[illegible]	Open, damp slope along road.
"	Sect. 26 T 40 N - R 39 E 2 miles N. Northport on W.side of Columbia River	39		1	2						3	Open, dry
"	Little Sheep Creek near Columbia River	40										No Ribes found
"	1 1/2 miles S. of town of Boundary,Wash	41		4	5						9	No Ribes seen along Boundary Northport road
"	3 miles E. of town of Boundary, Wash.	42						4	1		5	Damp slope
"	6.2 miles E.of town of Boundary,Wash.	43							2		2	Moist shade
"	8 miles E. of town of Boundary, Wash.	44					10				10	Moist, open, along road
"	2 miles N.E.of Leadpoint up creek and mining road	45					3	55	5		63	Moist, open
"	3 miles S.of Leadpoint on road to Spirit	46					6				6	Along edge of lake
"	7 miles S. of Leadpoint 1 mile S.W. of Current Creek	47								12	12	
"	12 miles S. of Leadpoint	48						2	1		3	Stream and shade
"	Martin, 709 Columbia Ave. Northport	49	4								4	
"	Back of house just S. of above location	50	1								1	
"	Laura Reed residence, Northport, Wash.	51	1								1	Removed by Felch and Simcoe 9/21/26 Shade and moist.
"	5 miles S. of Northport, Wash.	52							7		7	On stream
"	14 miles S. of Northport on Williams-Echo Road	53						2			2	Dry, shade
"	15 miles S. of Northport on Williams - Echo Road	54				25					25	In swampy draw. 500 feet above Columbia River
"	Sect. 5 T. 37 N - R 39 W 4 miles up Bruce Creek	55				7					7	Swamp, open to north
"	Phalon Lake, up Bruce Creek	56						6			6	Open
"	2 miles W. of Marcus on Pingston Creek	57				3					3	Stream, open
"	5 1/2 miles W.of " " " "	58				100					100	1 clump (400 sq. ft.) Swamp, open to north
"	9 miles W.of Marcus on " Creek loop	59				10					10	Swampy, fairly open
"	Near Lasswell Mill on Gamidge Hill Road	60				90					90	1clump (350 sq.ft.) Moist Open to north
"	6 miles N.of Colville on Road to Echo	61					3		[illegible]		8	Stream
"	7 1/2 miles N. of " " " " "	62				2					2	Stream
"	12 1/2 " " " " " " " "	63						2			2	Very open
"	2 miles W. of Rossburg	64						6			6	Open, dry
"	Close to Rossburg	65					3				3	Swampy, shady
"	2 miles N. of Marcus	66						2			2	Open, dry
"	1 mile up Hungary Hill road on the Marcus-Lake Pierre route	67						4			4	Open, dry
"	1 mile S. of Lake Pierre	68						3			3	Open, dry
"	1 mile N. of Lake Pierre	69				60					60	Swampy.50 plants in open 10 in shade
"	T 40 N - R 37 E Sec.31 N.W.Lake Pierre	70				50					50	Open, swampy
"	Sec.19 T 40 N - R 37E Both sides of road turning off just E. of school	71				12					12	Moist, shady
"	Near section line between Sec.8 and 9 T. 40 N - R 37 E	72				100					100	Large clump of bushes. Stream,open
"	W.A.Leonard Ranch Sec.35 T.39N-R.37E	73				50					50	Swampy, open
Ferry	4 miles S. of Curlew on road to Republic	74				2					2	Stream
"	7 1/2 miles S. of Curlew on road to Republic	75				4					4	Stream, open
"	W of Republic 8 miles - 1 mile from highway up N.Fork San Poil River	76				3					3	Stream, open
"	2 miles up stream from No. 76	77				2					2	Stream
"	5 1/2 miles W. of Republic on road to Tonasket	78				2					2	Swampy, open
"	2 1/2 miles W. of Republic on road to Tonasket	79				20					20	Swampy
"	Republic,behind building at Red Mill	80				1					1	Moist, open
"	2 mile S,of Republic on road to San Poil Lake	81				50					50	Swampy, open
"	6 1/2 miles S. of Republic on San Poil Road	82				26					26	
"	8 miles S. of Republic	83				3					3	Stream, open to north
"	11 miles S. of Republic	84				3					3	Swamp
"	Deer Creek on W. side of Curlew Lake	85				6	15				21	Moist, open
"	12 miles W. of Curlew up Nicholson Creek Road	86				1					1	Stream
"	4 miles W.of location No. 86	87				9					9	Stream, open
"	6 miles N. of Curlew. 1 mile up Little Goosemens Creek	88						2	6		8	Damp, fairly open
"	Ranch 300 yds. S.E.of Customs Office at Danville, Wash.	89	6								6	Eradication conditions. good for infection
B. C.	Grand Forks, B. C.	90	4								4	Conditions for infection not good
"	Grand Forks, B. C.	91	8								8	Conditions for infection not good
"	Grand Forks, B. C.	92	7								7	Conditions for infection not good
"	Grand Forks, B. C.	93	[illegible]								5	Conditions for infection not good
Stevens	2 mile NE of Kettle Falls at Dewey Land Company, in orchard	94	2								2	Eradicated by Simcoe and Felch
"	1/2 mile E. of Colville	95				6					6	Moist, open to N.
"	Sec.22 T. 33N-R 39 E 2 miles W. of Addy	96				1					1	Moist, open
"	Sec.27 T.33N-R 39 E 6 mi.S.W. of Addy	97				2					2	Moist, open
"	Sec.35 T.33N-R 39 E 2 miles W. of Blue Creek	98				12					12	Moist, open
"	Sec.29 T.33N-R 40 E 1 mile E. of Blue Creek	99				23					23	Moist, open to north
"	Sec.11 - T.32 N-R 40 E N. of Chewelah 9 miles	100				4					4	Moist, open
"	Sed.19 T. 33 N-R 41 E 6 miles N. of Chewelah	101				5					5	Stream, open to N.
"	Sec.27 T. 32 N - R 41 E	102				1					1	Stream, open
"	Sec. 4 T. 31 N - R 40 E	103				8					8	Stream, open
"	Sec. 6 T 31 N - R. 40 E	104				1					1	Swampy, open
"	Sec. 14 T. 31 N - R 39 E	105				2					2	Stream, fairly open
"	Wm. Taylor's Ranch S. shore of White Lake	106	2								2	2 sprouts (15 F.L.S.) Eradicated by Felch
"	5 miles N. of Springdale on road to Chewelah	107				7					7	Swampy, open
"	1 mile N.W. of Springdale on road to Chewelah	108				8					8	Stream, open

Table No. II

Summary of Table No. I
Scouting in Northeastern Washington, 1926.

County	Number of Ribes Inspected																	
	R. nigrum		Cultivated Gooseberries		Cultivated Red Currants		R. petiolare		G. inermis		R. viscos.		R. lacustre		R. aureum		Total Ribes	
	Insp. Points	Plants	Insp. Points	Plants	Insp. Points	Plants	Insp. Points	Plants	Insp. Points	Plants	Insp. Points	Plants	Insp. Points	Plants	Insp. Points	Plants	Insp. Points	Plants
Pend Oreille	1	2	3	19	3	36			3	12	12	30	16	157			25	306
Stevens	5	10	2	5	2	7	28	609	11	47	13	99	10	38	1	12	63	827
Ferry	1	6					14	132	1	15	1	2	1	6			16	161
B. C. (Canada)	5	32															5	32
Totals	12	50	5	24	5	43	42	741	15	74	26	181	27	201	1	12	109	1326

Note: The total of all Ribes inspection points is less than the total of Ribes species inspection points, because often more than one Ribes species was found at one inspection point.

Table No. III

Black Current Eradication Done During the Course of Scouting for the Disease

County	Black Currants Inspected					
	Eradicated		Not Eradicated		Total	
	Plantings	Plants	Plantings	Plants	Plantings	Plants
Pend'Oreille			1	2	1	2
Stevens	3	5	2	5	5	10
Ferry	1	6			1	6
Totals	4	11	3	7	7	18

III. Summary of all Scouting, Northeastern Washington, 1922 to 1926.

Table No. IV shows in summary form the results of all scouting performed in northeastern Washington, 1922 to 1926.

Table No. IV

Summary of Scouting, Northeastern Washington, 1922 to 1926

Host Plants	1922		1923		1924		1925		1926	
	Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected
Black Currants	66	0	1604	62	434	0	25	0	18	0
Red Currants and Gooseberries	298	0	300	1	104	0	67	0	67	0
Ribes petiolare	0	0	0	0	369	0	6334	0	741	0
Other wild Ribes	1850	0	2731	0	543	0	17026	0	468	0
White Pines	75	0	0	0	0	0	0	0	0	0

Table No. III

Black Currant [illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Totals	4	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible] in summary form the results of all scouting performed in [illegible]

Table No. IV

[illegible]

In addition to the scouting in Washington reported in Table No. I there were 20 R. petiolare inspected and found free from blister rust at Lake Eloika, Spokane County, on September 30, 1926, by W. A. Rockie. These bushes were located 1/4 mile west of the Blake farmstead, 1/4 mile south of the nearby boat landing, and 100 feet south of the road. White pine occurred within 1,000 feet. This location constitutes an excellent permanent inspection point.

SCOUTING FOR THE DISEASE IN WESTERN WASHINGTON

The following reports, in letter form give the results of the scouting work in western Washington during 1926:

Botany Dept., O.A.C.,
Corvallis, Ore.,
June 2, 1926.

Mr. S. N. Wyckoff
618 Realty Building,
Spokane, Washington.

Dear Wyckoff:

The investigation carried on by Mr. Patty and I in northwestern Washington was in many ways disappointing. In the first place the weather was most unfavorable for scouting, it rained practically all the time. Second, the aecial stage instead of being far advanced as we thought proved to be late, in fact when we closed our work the aecia were only then coming through in meagre numbers and the Ribes in most cases showed no infection. Third, we did not find infection at any point further south than it had been found formerly and the known points of infections can hardly account for the spread into Oregon last fall. Fourth, the area proved to be too vast to cover adequately. In spite of these things some information was gleaned which should prove of value in future scouting.

The accompaning map gives the roads travelled. The red triangles show infection points and the red circles associations of white pines with Ribes bracteosum.

Before doing this work I believed we would find infection practically any place in the Hoods Canal region and west of Olympia to Aberdeen where a good association of R. bracteosum and white pine was located. While that did not prove to be the case I still believe that it is but a short postponment. Any place north of the Duckabush where we got an excellent association of the two we got diseased pines. On the other hand association of pines with other native Ribes does not seem to result in infection. They were found repeatedly associated with G. lobbii, G. divaricata, R. lacustre and R. sanguineum and no infection was found. I am not predicating what may occur with intensification of the rust in any locality. It seems evident, however, that Blister Rust would not occur at present in many of the sections where we found it if it had not been for R. bracteosum.

The following is a brief discussion of the different infection areas found. The infections in all cases were on small or comparatively small trees. The numbers refer to those on the maps which are on file at the Spokane office and at 235 Agricultural Hall, O.A.C., Corvallis, Oregon.

#1. This is located on the Duckabush River, about one mile from its mouth. Mr. Detwiler and I found one canker on a small tree in this area early in March of this year. Mr. Patty and I, on examining the same tree more carefully, found three more branch cankers. In each of these the disease apparently entered the 1923 needles. Six other trees were found in this area. The oldest canker we encountered was in this locality. It was a branch canker where the disease had entered the 1916 needles. There were several cankers on 1921 and 1923 year wood, one entering a side branch had formed a large stem canker. See photograph of one infected tree.

The only Ribes found in this locality was R. bracteosum about 75 yards away. In the later part of May none of these cankers had shot spores and no uredinia had appeared on the R. bracteosum. The accompanying sketch gives the location of this area. It is easily accessible and readily located.

#2 Areas #2, #3, and #4 could readily be considered one area but for convenience in discussion I prefer to keep them apart. Mr. Detwiler and I found several cankers in area #2 early in March. Here the second growth pines are quite numerous along the highway and the nearby stream(Spencer Creek). Mr. Patty and I observed several cankers in addition to those Mr. Detwiler and I located. About 8 infected trees were found. All the cankers were young occurring on 1921 or 1923 wood but not all the trees were closely associated with the _R. bracteosum._ Several were along the road a short distance from the creek but the road clearing here offered an excellent sweep for the wind with _R. bracteosum_ at both ends of the passage. Late in May a few pustules were breaking out on the cankers on these pines but no infection was found on Ribes.

#3 This area is 300 or 400 yards below Rainbow Camp and a short distance above the elbow of the Big Quilcene. Here the brush and trees form a dense growth and the movement of winds is not free. At this place Mr. Patty and I found three infected trees. All had branch cankers mostly on 1921 and 1923 wood.

One canker which had evidently shot spores for the past two seasons occurred on the 1920 and 1921 wood.

The association in this area of pines with _R. bracteosum_ was very close, in many places the bushes were immediately below the trees. A very few pustules had appeared on _R. bracteosum_ and _R. lacustre_ by the middle of May.

While this area is easily located the infected trees are not as easily detected as in other sections.

#4 This area was located by me early in March and Patty and I did not visit it in May. Only one tree was found and to facilitate examination it was cut down. One incipient canker which was unmistakable was located on 1923 or 1924 wood. There was a rather poor association here with _R. bracteosum_ along the Quilcene. A more extended search in this locality would doubtless reveal other infections.

#5. This area near a school house about one mile northeast of Paulsbo should be studied further. Only one canker on 1923 wood was found but the pines are near a stream and in places R. bracteosm is plentiful although it was not noticed in the immediate section where the infection was found. Examination here was, however, very cursory due to approaching darkness and rain. We did not have opportunity to pay this region a second visit. Infected pines in this section can redily give rise to infection spreading further to the east than we have hitherto observed. It will not be surprising to find heavy infection this year on R. nigrum in the Puyallup section and even on the R. bracteosum on the streams coming from the Rainier National Forest.

#6. Only one small canker in 1923 wood was found in this locality. The area occurs near the old Eden school. The infected tree was on the edge of a steep gulch with R. bracteosum on the stream below. The association, however, was not good as the stream was not well exposed, the Ribes were some distance away and the pine was standing where the winds would have a drying effect.

#7. This is one of our banner infection areas. It occurs on the highway about three miles below the Log Cabin Hotel. The association of R. bracteosum and the pines is good. The cankers are all of lusty proportions, three large stem cankers on 1921 wood and several branch cankers on 1921 wood were spotted. In all, 7 trees were found.

There is no place for relating an incident like in its setting. While Mr. Patty and I were examining these trees a rancher came by. I asked him if he would be interested in seeing White Pine Blister Rust, a serious disease on pines. His reply was that he would. I took him to a tree on which an old burned log had been rolled. The tree, however, was alive at that time. "Why," he said, "there is nothing wrong with that tree except that that log was piled on it. It was a pretty tree before that." "All right," I said, "if you are from Missouri we will have to show you." The next tree had a branch canker and at first he thought it was a wound but admitted it looked somewhat diseased. He became thoroughly convinced, however, when he had spotted a canker independently of our help. He than told us he had planned on purchasing this area since it was next to the highway and cutting out the fir trees and leaving the pines. When we explained the relation of the wild black currants to the disease he gave up in despair. He would have been willing to clear out the bushes along the stream but he said the whole hillside opposite was covered with them. We ourselves felt that the hillside was uncomfortably close and did not try to start him on a local control project.

#8. An accompanying photograph will add interest to this area. It is located on the Fairholm place at the extreme head of Crescent Lake. All the pines were planted here about ten years ago.

All but one of the seven were infected. One showed no evident canker or incipient infections. One tree was dead from a stem canker and others were so badly infected as to be monstrosities, the stem and branch cankers coalescing in some cases. The oldest canker was apparently on 1919 wood, most were on 1921 and 1923 wood. The stem canker on the dead tree was probably a 1919 canker.

In some of these trees the pustules were just coming out in good shape on May 23 and the first crop of uredinia had appeared on R. bracteosum which was com on along the stream a few rods away. Joe Orris, the keeper in the place was much concerned and began the eradication of the wild black currants along the stream at once, a very useless thing to do as far as these pines were concerned as they were already too far gone. He showed us two cultivated bl ck currant bushes perhaps 200 yeards away but these showed no signs of infection. We explained that these were to be classed with the wild blacks as a menace to the pines and suggested that he keep them under observation. The next day when we passed the patch on our return from a trip on the mountain the bushes had totally disappeared.

This is only one case where men expressed appreciation of the pines. One man near Joyce had planted pines all around his place and these were in excellent conditon. He remarked that the white pines would be the next generation of trees in that section as they were coming in much more abundantly than they were in the original stand. White pines are found in cultivation frequently. While none of this would be convincing to a lumberman in a Douglas Fir belt it may be prophetic of the future. There are places in the Olympics where white pines constitute a good percent of the mature forest and the trees are superior in ev ry way. It is difficult to predict just what the future of the tree will be in the reforestation of vast burned over areas in this region. The Forest Service used it to some extent in reforestation work in the Soleduck burn. While beetle work is severe in limited areas as in places in the Rainier National Forest it hardly seems possible that it will prove to be even so great a problem in white pine production as it is proving to be in yellow and lodge pole pine. One disconcerting feature is that the timber is attacked before maturity, comparatively small trees being attacked while the fully mature trees are free.

A more serious menace in certain sections seems to be the fungus Scleroderris which attacks the young timber chiefly and often with killing effect. While older trees are also attacked the damage is slight. It is the presence of Scleroderris which causes the flagging so noticeable to the traveller in Olympic section. There seems to be a very evident connection between Scleroderris attacks and the work of Aphids. Scleroderris is a pretty things to play with in its home. Conceivably it might constitute a real pest if introduced into other regions.

The blister rust infection at the head of Crescent Lake is of more than passing interest. A glance at the map will show that there is only a slight divide between Crescent Lake and the head of the Soleduck. Spores have most certainly been blown to the west and south.

This is a region of abundant R. bracteosum and pines are most certainly similarly abundant in places. The association to be feared is where R. bracteosum occurs in the upland swamps where there is also white pine. This, I am told, is the situation in parts of the Quinault Indian Reservation. In mature forests, situations of this kind are located with extreme difficulty and the disease will certainly be similarly difficult to locate.

I feel that the scouting in the future should be along slightly different lines. The findings Patty and I made should be kept strictly in mind in future work. Some definite fall scouting should be done, keeping in mind associations which were located this spring. It seems almost certain that pines will begin to show infection at points marked on the map by red circles especially at #2, #6, #3 and #4. The associations at the other points are not so good. At #5 the pines were planted recently on a school ground, the R. bracteosum on the near-by stream is not abundant and it is probable the Agricultural classes in the High School, will clear it out. There is a fair association at #1. If these points are visited in the fall, heavy infection on Ribes will indicate that the pines are already infected and have been shooting spores or that pine infection is likely in the near future. Infection on the cultivated black currants at Puyallup and R. bracteosum along White River will indicate that Blister Rust is traveling toward the Cascades.

I fear that a heavy infection exists some place between Crescent Lake and the mouth of the Queets River. If this is true scouting this fall for infection on the Ribes should help to locate it. Work is being done on the highway from the Queets to Forks. When this is opened this country will be more accessible.

From our observations it seems evident that the rust has been on pines in Washington for a number of years, probably as early as 1918 and perhaps earlier. It also seems evident that R. bracteosum should be on the black list. Its association with white pines is equivalent to infection in the past, present or not distant future throughout the west. It is highly probable that blister rust would have established itself with difficulty in western Washington without the aid of R. bracteosum. It seems quite as serious as the cultivated black currant.

The State Forest Service of Washington and the U. S. Forest Service were very helpful to Mr. Patty and myself in our work in western Washington.

The following were especially helpful: Mr. Joy, State Forester, Olympia, Washington; Mr. H. F. Weineke, Fire Warden, Port Discovery, Washington; Mr. A. M. Thomas, Fire Warden, Leland, Washington; Mr. Plumb, Forest Supervisor, Olympia, Washington; Mr. J. H. Billingslea, Forest Service, Olympia, Washington; Mr. W. D. Bryan, Forest Ranger, Quilcene, Washington. The last named four accompanied Mr. Patty and me to the infection areas on the Quilcene, on Spencer Creek and on the Duckabush.

Respectfully submitted,

L. N. Goodding,
Assistant Pathologist.

Botany Department, O. A. C.,
Corvallis, Oregon,
August 18, 1926.

Mr. S. N. Wyckoff
618 Realty Building,
Spokane, Washington.

Dear Mr. Wyckoff:

As I said in my last letter the location Mr. Billingslea gave me did not prove to be infected with blister rust. The trees were, however, badly infected with Scleroderris treleasii. Dr. Boyce says that it is by far the most severe attack of this disease he has ever seen. Hundreds of young white pines are affected. Many limbs are dead and occasionally a main stem is completely girdled and killed.

Ribes in the area which is located along the trail from Barnes Creek to the Storm King, above Crescent Lake, are very few, in fact practically nil. Two bushes of Ribes sanguineum were found on the slope and R. lacustre and R. bracteosum are along the stream below but out of range of the pines. Dr. Boyce found and incipient blister rust canker on a white pine twig in this section. This seemed remarkable as no Ribes could be found near it.

The aecia production must have been exceedingly light in all the infected areas we located. The heaviest Ribes infection we found was on the Duckabush. None was found on Spencer Creek and but one leaf at Fairholm on Crescent Lake and none was found below Piedmont.

We located a new area at Chico north of Bremerton. At the north edge of Chico are two beautiful homes with lawns and flowers. At one of these places in the yard east of the road is a large white pine 60 to 70 feet high and 1½ feet in diameter. The lower limbs have been pruned. Two years ago I could detect no infection on this tree but when Felch and I visited the place August 12, 1926 I observed a flagged limb perhaps 20 feet up the tree. This proved to be an old canker and the limb was practically dead. The oldest portion of the canker was on 1915 or 1916 wood or possibly older, as the limb was dead it was not easy to determine. No other cankers could be found on the tree.

We scouted along the nearby streams but found no R. bracteosum but did find R. sanguineum and G. divaricata neither of which were very close to the pine.

Just south of Chico, less than a quarter of a mile from the above location, are abundant young pines in close association with *R. sanguineum* with an occasional *G. divaricata* bush. The situation is a dry one or at any rate there are no streams. Here we counted 28 infected trees in an area of perhaps 20 or 30 acres. Many of them had large stem cankers. Some trees had many cankers. All seemed to be on 1919, 20, 21, and 22 wood. No year seemed to have been slighted. The *R. sanguineum* leaves were spotted with dead areas but we could detect no uredinia. I am inclined to believe, however, that much of this spotting was due to early uredinial infections.

As this area is easy of access I think we should keep it under observation. We should also try to determine whether cultivated black currants were formerly grown near the large pine. If this proved to be true it is almost certain the infection started in this way. Of course, a more careful examination may reveal a little *R. bracteosum* not far away or it may be that there was a chance infection on *R. sanguineum* or *G. divaricata* and the rest was the result of intensification.

Yours very truly,

L. N. Goodding,
Assisitnt Pathologist.

Copies sent to
Mr. H. L. Plumb, Supervisor of Olympic National Forest.
Mr. S. B. Detwiler.

BLISTER RUST CONTROL IN OREGON
1926

Blister rust control work in Oregon during 1926 has consisted of the following projects; inspection and sanitation of nurseries, scouting for locations of host plants of the disease, scouting for the disease in northwestern Oregon, educational work and a recheck of the Prospect area on the Crater National Forest on which experimental Ribes eradication was carried on in 1925. This work has been done under the supervision of Mr. L. N. Goodding, Assistant Pathologist, State Leader for Oregon. Mr. Goodding is headquartered at Corvallis, Oregon, office space for the several projects being provided by the Oregon Agricultural College. This work has been organized under the terms of the cooperative agreement included in Mr. Goodding's report:

BLISTER RUST CONTROL WORK IN OREGON, 1926.

by

L. N. Goodding
Assistant Pathologist

The blister rust work in Oregon in 1926 is considered under the following heads:

I. Memorandum of Understanding.

MEMORANDUM OF UNDERSTANDING BETWEEN THE OREGON STATE BOARD OF HORTICULTURE, THE OREGON STATE BOARD OF FORESTRY, THE OREGON AGRICULTURAL COLLEGE AND THE BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WORK ON THE CONTROL OF WHITE PINE BLISTER RUST IN OREGON.

EFFECTIVE JULY 1, 1926 TO JUNE 30, 1927.

For the purpose of effectively controlling the white pine blister rust in Oregon, the several cooperating agencies shall participate in a joint program as indicated below.

1. The Bureau of Plant Industry shall employ and direct the work of one or more persons to assist in prosecuting the following cooperative activities; eliminating the cultivated black currant (Ribes nigrum) from the State by systematically locating and securing the destruction of these plants; inspecting plant shipments, in cooperation with the Federal Horticultural Board, at strategic terminal and transfer points to detect and prevent violations of the State and Federal blister rust quarantines; scouting to determine the presence of the disease in the State; performing control reconnaissance; conducting experiments and demonstrations in local control methods; inspecting nurseries handling blister rust host plants for interstate trade in order to prevent further spread of the disease on such plants.

BLISTER RUST CONTROL WORK IN OREGON, 1926.

by

L. N. Goodding
Assistant Pathologist

The blister rust work in Oregon in 1926 is considered under the following heads:

I. Memorandum of Understanding.
II. Educational Work.
III. Black Currant Eradication.
IV. Scouting for the disease in Oregon.
V. Quarantine Work.
VI. Nursery Inspection - E. M. Hornibrook.
VII. Inspection of Native Host Plants in the Cascade Region - F. P. Sipe.
VIII. Established Inspection Points.
IX. Ribes Reproduction in burns near Detroit, Oregon.
X. Recommendations for Future Work.

I. Memorandum of Understanding.

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The Bureau of Plant Industry is responsible for the proficiency of its employees assigned to duties under the terms of this agreement and in addition agrees to provide the necessary technical information regarding the disease to such employees of the other cooperating agencies that are assigned to work contemplated in this agreement.

2. The Oregon Board of Horticulture shall employ and direct the work of one or more men who shall, at the proper seasons thoroughly inspect for blister rust all nurseries in the State growing currants, gooseberries or white pines; establish and make periodic inspections at definite inspection points in western Oregon which in its judgment and the judgment of the Bureau of Plant Industry constitute favorable points for the determination of the spread of white pine blister rust; inspect, previous to the time of shipment, all shipments of currants or gooseberries, as required under terms of any quarantine orders promulgated by the Oregon State Board of Horticulture or the Federal Horticultural Board. The Oregon State Board of Horticulture shall further issue special instructions to its county inspectors concerning the eradication of the cultivated black currant (Ribes nigrum) and the enforcement of State and Federal blister rust quarantines and in so far as their other duties permit these persons shall cooperate in prosecuting other blister rust control activities carried out under terms of this agreement. In addition the Oregon State Board of Horticulture shall deputize where necessary the employees of the other cooperating agencies to carry out their duties under the terms of this agreement.

3. The Oregon State Board of Forestry shall use its regular employees, so far as their other duties permit, in systematically locating and eradicating cultivated black currants, in scouting for the blister rust, and in assisting the other cooperating agencies in carrying out the activities enumerated in this agreement.

4. The Oregon Agricultural College agrees to examine all specimens suspected of being infected with white pine blister rust when sent in by the field scouts and others, and to keep the necessary records of such collections. It is also agreed that all specimens which are suspected of being infected with blister rust shall be submitted to the Bureau of Plant Industry for final determination. It is agreed that the County Agents and others of the Extension Service of the Oregon Agricultural College shall assist the Bureau of Plant Industry in the general publicity undertaken in the course of this program. It is further agreed that the Oregon Agricultural College shall furnish Mr. L. N. Goodding, the representative of the Bureau of Plant Industry engaged in blister rust control work in Oregon, such office space as is necessary for properly conducting his work.

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5. All official records showing work performed under this agreement shall be open to inspection by any or all parties to the agreement. All findings of the blister rust made by any party to this agreement shall be promptly reported to the other parties. All specimens collected or received by any party to this agreement which are suspected to be infected with blister rust shall be submitted to the Oregon Agricultural College for critical determination.

6. It is provided that from July 1, 1926 to June 30, 1927, the Oregon State Board of Horticulture shall expend about $14,000, the Oregon State Board of Forestry about $7,000, the Oregon Agricultural College about $1,500, and the Bureau of Plant Industry about $10,000 in the course of this work. All expenditures made by the Bureau of Plant Industry shall be in accordance with the fiscal regulations of the United States Department of Agriculture.

7. This memorandum of understanding shall take effect July 1, 1926 and continue in force until June 30, 1927, or until previously terminated by mutal consent of the parties concerned.

Date	Signature
Oct. 25, 1926	(s) F. A. Elliott Oregon State Board of Forestry.
Oct. 25, 1926	(s) Chas. A. Park, Oregon State Board of Horticulture.
Oct. 26, 1926	(s) H. P. Barss Oregon Agricultural College.
Dec. 9, 1926	(s) Wm. A. Taylor Chief, Bureau of Plant Industry, U. S. Department of Agriculture.

II. Educational Work

In January a trip was taken into the sugar pine region of Southern Oregon. Lane, Douglas, Coos, Josephine, Jackson and Klamath Counties were visited. County Agents, fruit inspectors, U.S. Forest Service officials and Fire Wardens were interviewed. Both the blister rust film and the lantern slides were used in connection with addresses in High Schools.

Circular letters were sent to the State forest men. (Copy accompanies report.) During the year many of these men were visited. A special effort was made to get in touch with all county agents and county fruit inspectors.

The county fairs and state fairs came at a time when it was impossible to prepare exhibits or have men in attendance at the exhibits, consequently nothing of this kind was undertaken.

All the postmasters in the quarantined counties were circularized by the Secretary of the State Board of Horticulture and through his agency the railroads and express companies instructed their agents in regard to Federal quarantine 63 and State quarantine 18.

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White pine blister rust is treated in some detail both in lecture and laboratory in the agricultural and forestry course in general botany and in general and forest pathology at the Oregon Agricultural College. The regular work is supplemented by illustrated talks by L. N. Goodding. Some reference to blister rust is made in botany courses at the State University and L. N. Goodding is usually asked to lecture to the assembled botany classes some time during the winter term.

STATE FORESTER, STATE HORTICULTURAL BOARD,
BOTANY DEPARTMENT AND EXTENSION SERVICE, OREGON AGRICULTURAL COLLEGE AND
BUREAU OF PLANT INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE
COOPERATING.

Office Blister Rust Control
Botany Department, O. A. C.,
Corvallis, Oregon,
July 20, 1926.

Mr. John Holmes
Fire Warden,
Bend, Oregon.

Dear Mr. Holmes:

The man who thought blister rust would never reach Oregon was a wild guesser. It was located last fall on Gnat Creek in Clatsop County and at Wheeler and Pacific City in Tillamook County. At Pacific City it was found on cultivated black currants and at the other points on wild black currants. If we found it in three places it doubtless occurred in others.

Scouting this spring in Washington revealed blister rust on pines in nine different localities on or near the Olympic Peninsula. There is little question that the spores from the Olympic Peninsula blew into Oregon and caused the infection found last fall.

If you are keeping two jumps ahead of this blister rust you are some jumper. It is on the way to the sugar pines and sooner or later, probably sooner, we will have to fight it by our developed local control methods.

We wish to know whether blister rust is in your section. Please hold a tight rein on your horses now. Blister rust may be in your section even if you do not have white pine within many miles. We found no white pine at Pacific City, Wheeler, or Gnat Creek but we found blister rust all the same.

Look for blister rust on the wild stink currant along the streams from August 15 until winter. If you find anything on these bushes you think may be blister rust send a specimen to me and we will write you about it.

If you are a new man on the job and have not received publications on blister rust let us know and we will supply you. Thanking you for your cooperation, I am

Yours very truly,

L. N. Goodding,
Assistant Pathologist.

III. Black Currant Eradication

No systematic search was made for cultivated black currants. A few were picked up by the inspectors. The total to date of plantings and bushes eradicated is as follows: Plantings - 1625, bushes - 38,582.

IV. Scouting for the Disease in Oregon

The inspection for blister rust was made more extensive than in 1925. The scouts working through the Cascades established inspection points and, at the time these were located, inspected the bushes. The nursery inspection was quite thorough and considerable assistance was given by the State men. When the fall work was done the coast line from the Newport region north was covered carefully and extended back from the coast into the Coast Range. Along the Columbia River inspection was done from eastern Multnomah County to the mouth of the Columbia. In Clatsop County the land was combed carefully toward the interior to Saddle Mountain. A special trip was taken to the head of Wilson River in Tillamook County where there are white pines and at the points in Astoria where there are cultivated white pines R. bracteosum bushes were critically examined.

Edmunds and Palmiter worked on inspection for blister rust after the reconnaissance work in the Cascades was over, September 7, until the latter part of September. Edmunds continued the work until November 16. After the close of the study of Ribes reproduction on burns, September 7, Anderson and Goodding did blister rust inspection along the coast from Tillamook north to Astoria. During a portion of this time Hawley assisted Sipe on nursery inspection and then assisted Walker and Stansbery in inspection along the Columbia at the inspection points and nurseries.

The following table gives in more detail the results of scouting for the rust in northwestern Oregon, during the fall of 1926.

Table No. I.

Scouting for Blister Rust.

County	No. Inspection Points	No. bushes Inspected	Species	Pine Location	Remarks
Benton	2	500+	R. bracteosum G. divaricata	O. A. C. Campus	Inspections were at inspection points (See inspection points.)
Clatsop	100+	10,000+	R. bracteosum	2 places at Astoria	Hours were spent along practically all streams running west and north, R. bracteosum abundant.
Columbia	Many miles along the Nehalem River. Along streams crossed by Columbia Highway, 20 or more	5,000+	R. bracteosum	None	
Hood River	Many points on Mount Hood Loop road.	100+	R. bracteosum	Abundant south of Mt. Hood	Only incidental to other work, chiefly Cascade Reconnaissance.
Lane	4	200+	R. bracteosum	U. of O. Campus Eugene	This county was not so thoroughly scouted as the northwest counties.
Lincoln	25 or more	100+	R. bracteosum	None	See inspection points. R. brac. was encountered in many places along Newport & Waldport highways & along coast & Siletz roads.
Linn	4	100+	R. bracteosum	None	One Nursery having Ribes was inspected.
Marion	2	100+	R. bracteosum	None inspected	The point on the Santiam was more than 5 miles long & several streams crossed, with abundant R. brac. The point higher in the Cascades was inspected in connection with the Cascade Reconnaissance.
Multnomah	See 3 inspection points, also 16 nurseries.	5,000+	R. brac. also cultivated currants & gooseberries	None specially examined	There are many white pines grown in Portland. There are also native trees in eastern portion.
Polk	2	100+	R. bracteosum G. divaricata	None inspected this year	Very little inspection was done in Polk because of the inaccessibility & lack of necessity.
Tillamook	4 inspection points also at least 25 other points	5,000+	R. bracteosum	Head of Wilson River	Both Ribes & pines were inspected on the head of Wilson River. R. brac. is abundant on lower Wilson River, along Tillamook highway & the highway to Astoria. All these locations were examined carefully.
Washington	3 points, also 5 nurseries	10,000+	R.brac. G. div. cultivated currants & gooseberries	On Gales Creek	Very careful nursery inspection was done in Washington County.
Yamhill	3 points, also 1 planting cultivated black currant & 1 nursery.	500+	R. bracteosum R. nigrum	None	The planting of black currants was destroyed. The plants were carefully examined by Goodding & Hornibrook.

In more southern counties scouting was more superficial.

V. Quarantine Work.

During the spring an attempt was made to check the steady influx of R. sanguineum from Washington. The State Horticultural men posted the interstate bridge and the ferries and bridge at Hood River. This work was done only on Sundays and holidays. One hundred eight violations were caught on one Sunday.

This situation is by no means handled efficiently. As blister rust intensifies in Washington, this becomes more and more of a menace. There is more opportunity here to distribute the disease artificially than in any other part of the Northwest. Sunday inspection is all right and constitutes about 1/7 the work it should.

Fall inspection for R. sanguineum is not necessary.

Mr. Patty was stationed in Portland for the fall inspection. On October 1, Mr. Hornibrook took up inspection along the quarantine line in Oregon. He visited post offices, freight and express offices as well as the nurseries. His special duty was to cooperate with the county fruit inspectors in seeing that nurseries were properly informed in the workings of Federal Quarantine 63 and State Quarantine 18. He also located the commercial Ribes plantings and kept watch of these to see that they were doing no shipping. Goodding assisted in this work but spent most of his time in the coast counties visiting county fruit inspectors and postmasters lining them up on the provision of the Federal Quarantine 63 and State Quarantine 18. The nurseries in the quarantined region doing business in Ribes and those obtaining proper certification are reported under Nursery Inspection.

Personnel

State men in inspection work:

- J. E. Stansbery, State Inspector, Portland.
- M. Bozarth, Inspector on docks, trains, etc., Portland.
- Chas. Walker, County Fruit Inspector, Multnomah County, Inspector in Portland.

County Fruit Inspectors:

Clatsop	C. E. Dow, Astoria, Ore.
Columbia	Grant Lynch, Scappoose, Ore.
Washington	Chas. R. LaFollette, Cornelius, Ore.
Yamhill	V. A. Vincent, Newberg, Ore.
Tillamook	W. D. Pine & Mr. Houghton, Tillamook, Ore.
Lincoln	M. J. Conklin, Toldeo, Ore.
Polk	J. R. Beck, Dallas, Ore.

Requests have been made to have these places listed as terminal inspection points.

Federal Men.

J. T. Baker, Federal Horticultural Board, Portland, Ore.
Frank A. Patty, Blister Rust Inspector, Portland, Ore.
E. M. Hornibrook, Along Quarantine Line and in Quarantine Counties.
L. N. Goodding, in Quarantined Counties.

Several counties out of the quarantined area have County fruit inspectors but they are less directly connected with this quarantine enforcement.

The following are copies of quarantine No. 18, the key used on quarantine 18 and 63, restrictions on interstate movement of currants and gooseberries and a form letter which was sent out by Mr. Cole notifying the postmasters of these quarantine regulations.

QUARANTINE No. 18 (STATE OF OREGON)
(With Regulations)
PERTAINING TO WHITE PINE BLISTER RUST.

The fact has been determined by the President of the Oregon State Board of Horticulture that a dangerous plant disease known as White Pine Blister Rust (Cronartium ribicola Fischer), not heretofore prevalent, now exists in certain localities of the State of Oregon, and in order to protect the five-leafed pine forests of the State it appears necessary to prohibit the intrastate movement of all known host plants of this disease, namely currant and gooseberry plants (Ribes and Grossularia, including cultivated or wild or ornamental sorts), and five-leafed pines (Pinus) except as hereinafter provided.

Now, therefore, I, Chas. A. Park, President of the Oregon State Board of Horticulture, under the authority conferred by Section 1 of Chapter 246 of the General Laws of Oregon of 1913, and Section 4 of Chapter 342 of the General Laws of Oregon of 1915, consider it necessary, in order to protect the five-leafed pine forests of the State from further spread of the white pine blister rust, do hereby quarantine each and every county in the State of Oregon, and from and after the publication of this notice in three newspapers published within the State of Oregon, it shall be unlawful for any person, firm or corporation to carry or transport any currant or gooseberry plants (Ribes or Grossularia, including cultivated or wild or ornamental sorts) or five-leafed pines (Pinus) within the State of Oregon except as hereinafter provided.

Regulation 1. Definitions.

(a) Currant and Gooseberry plants: Plants, cuttings, or scions belonging to the genera *Ribes* L. and *Grossularia* (Tourn.) Mill., including cultivated or wild or ornamental sorts.

(b) Cultivated red and white currant plants: Plants, cuttings or scions of garden varieties of currants derived from *Ribes vulgare* Lamarck, *R. rubrum* L., *R. petraeum* Wulf., and *R. sativum* Syme, and their hybrids.

(c) Cultivated gooseberry plants; Garden varieties of gooseberries derived from the American or European species and their hybrids.

(d) European black currants (Ribes nigrum): The cultivation of which is prohibited by law. (L. 1923, c. 65).

(e) Mountain currants: Plants, cuttings or scions of *Ribes alpinum* L., also known as alpine currant.

(f) Dormant: In a nonvegetative state, with inactive buds.

(g) Intrastate: Movement within the state.

(h) Five-leafed pines: Plants, branches, limbs and twigs of the following species belonging to the genus *Pinus*.

American species:

Ayacahuite pine (*P. ayacahuite* Ehrenb.)
Bristle-cone pine (*P. aristata* Engelm.)
Foxtail pine (*P. balfouriana* Murr.)
Limber pine (*P. flexilis* James.)
Mexican white pine (*P. strobiformis* Engelm.)
Sugar pine (*P. lambertiana* Dougl.)
Western white or silver pine (*P. monticola* Don)
White bark pine (*P. albicaulis* Engelm.)
White pine (eastern)(*P. strobus* L.)

Foreign species:

Balkan pine (*P. peuce* Griseb.)
Chinese white pine (*P. armandi* Franch)
Himalayan or Bhotan pine (*P. excelsa* Wall.)
Japanese white pine (*P. parviflora* Sieb. & Zucc.)
Korean pine (P. koraiensis Sieb. & Zucc.)
Swiss stone pine (*P. cembra* L.)

Regulation 2. Five-leafed pines shall not be moved or allowed to move intrastate from the counties of Clatsop, Columbia, Lincoln, Polk, Tillamook, Washington and Yamhill.

Regulation 3. Except as hereinafter provided, currant and gooseberry plants, other than the European black currant, shall not be moved or allowed to move to any portion of the State of Oregon from the counties of Clatsop, Columbia, Lincoln, Polk, Tillamook, Washington and Yamhill.

(a) That the plants and premises on which said plants were grown have been inspected during the months of September and October previous to shipment by the proper state inspector and such plants and premises are found to be free from white pine blister rust.

(b) That there exists no *Ribes nigrum*, *R. bracteosum*, *R. aureum*, *R. odoratum*, or *R. petiolare* within a radius of one mile of the spot where said plants were grown and that the vicinity within a radius of one mile of said plot was carefully scouted for white pine blister rust during the period from September 1 to October 31 and that no blister rust infection was found.

(c) That the plants were shipped in a dormant and defoliated condition.

(d) That the whole of said plants, except the roots, have been immersed before shipment in a solution consisting of one part of concentrated lime-sulphur testing not less than 32 degrees Baume to eight parts of water, the dilute solution to test not less than 4.5 degrees Baume.

(e) That the plants shall move intrastate from said counties only between November 1 of the year of inspection and April 15 of the following year.

(c) Five-leafed pines moved from counties other than those named in Regulation 2. Each car, box, bail or other container of five-leafed pines moved intrastate shall be plainly marked to show the name and address of the consignor, and the name and address of the consignee, and the contents as five-leafed pines, and each such shipment shall bear on the outside a permit stating that the requirements of Regulation 5 have been complied with and such permit shall be signed in writing by the proper state inspector.

(d) Carload and bulk shipments: When the plants specified under this regulation are moved in carload lots or other bulk shipments the permits required shall accompany the waybill, conductors' manifests, memoranda, or bill of lading, or, in the case of truck or other road vehicle, such permits shall accompany the vehicle.

Regulation 8. The use of the permit tag is hereby prohibited except during the period of time specified in Regulation 3 (e), nor shall the tag be used when the certificate of inspection is withdrawn in accordance with Regulation 9 or when, after the certificate of inspection has been issued, conditions on the premises to which said inspection certificate applies are found not to conform to the requirements of Regulation 3 (a) and (b).

Regulation 9. In addition to the penalty provided in the Quarantine Laws of Oregon (L. 1913, c. 246), certificates issued by the Oregon State Board of Horticulture as a condition of intrastate movement of plants permitted by these rules and regulations may be withdrawn and further certification refused to any grower or shipper who violates any of such rules and regulations.

This quarantine supersedes Quarantine No. 15 issued December 26, 1925. Done in the office of the Oregon State Board of Horticulture, Portland, Oregon, this 14th day of September, 1926.

Chas. A. Park
President of the Oregon State Board of Horticulture.

Executive Office, Salem, Oregon.
September 14, 1926.

I, Walter M. Pierce, Governor of the State of Oregon, do hereby approve the foregoing promulgation and designate the following three newspapers in the State of Oregon as the newspapers in which said promulgation shall be published:

Oregon Statesman	Salem, Oregon.
Oregon Journal	Portland, Oregon.
Astoria Budget	Astoria, Oregon.

Walter M. Pierce
Governor of the State of Oregon.

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KEY TO PROVISIONS OF FEDERAL QUARANTINE NO. 63 AND OREGON QUARANTINE NO. 18
AS APPLIED TO BLISTER RUST HOST PLANTS DESTINED TO OREGON.

From	White Pine	Black Currant	Cult. red, white & alpine currants & cult. gooseberry	Other currant and gooseberry plants
Alabama	Prohibited	Prohibited	A	A
Arizona	A	"	A	A
Arkansas	Prohibited	"	A	A
California	A	"	A	A
Colorado	A	"	A	A
Connecticut	Prohibited	"	A-B-C-E	Prohibited
Delaware	"	"	A	A
Dist. of Col.	"	"	A	A
Florida	"	"	A	A
Georgia	"	"	A	A
Idaho	A	"	A	A
Illinois	Prohibited	"	A	A
Indiana	"	"	A	A
Iowa	"	"	A	A
Kansas	A	"	A	A
Kentucky	Prohibited	"	A	A
Louisiana	"	"	A	A
Maine	"	"	A-B-C-E	Prohibited
Maryland	"	"	A	A
Massachusetts	"	"	A-B-C-E	Prohibited
Michigan	"	"	A-B-C-E	"
Minnesota	"	"	A-B-C-E	"
Mississippi	"	"	A	A
Missouri	"	"	A	A
Montana	A	"	A	A
Nebraska	A	"	A	A
Nevada	A	"	A	A
New Hampshire	Prohibited	"	A-B-C-E	Prohibited
New Jersey	"	"	A-B-C-E	"
New Mexico	A	"	A	A
New York	Prohibited	"	A-B-C-E	Prohibited
North Carolina	"	"	A	A
North Dakota	A	"	A	A
Ohio	Prohibited	"	A	A
Oklahoma	A	"	A	A
Oregon (clean)	F	"	A	A
Oregon (infected)	Prohibited	"	D-E-G	Prohibited
Pennsylvania	"	"	A-B-C-E	"
Rhode Island	"	"	A-B-C-E	"
South Carolina	"	"	A	A
South Dakota	A	"	A	A
Tennessee	Prohibited	"	A	A
Texas	A	"	A	A
Utah	A	"	A	A
Vermont	Prohibited	"	A-B-C-E	Prohibited
Virginia	"	"	A	A
Washington	"	"	A-B-D-E	Prohibited
West Virginia	"	"	A	A
Wisconsin	"	"	A-B-C-E	Prohibited
Wyoming	A	"	A	A

*Counties in Oregon Infected: Clatsop, Columbia, Polk, Tillamook, Washington, Yamhill and Lincoln.

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LEGEND

A. Must be marked to show the names and addresses of the consignor and consignee and contents as to five-leafed pines or currants or gooseberries. Must be accompanied by certificate of nursery inspection of state of origin to the effect that plants and premises were inspected within one year (giving date of inspection) and found free from white pine blister rust.

B. Each container must have attached a permit tag bearing (1) the serial number of the permit issued by the Federal Horticultural Board to the consignor; (2) the date of the certificate issued the consignor by the Inspector of the Federal Horticultural Board; (3) a certificate from the consignor stating that the currants and gooseberry plants in the shipment are the plants to which the Federal permit and inspection certificate, referred to on the permit tag accompanying the shipment, apply; and that before said plants were shipped they were immersed in a solution of lime-sulphur.

C. Admissible only between October 1 and May 15 following.

D. Admissible only between November 1 and April 15 following.

E. Must be dormant and defoliated.

F. Must have permit from State Board of Horticulture stating pines were grown from seed on plot with no Ribes nigrum, R. bracteosum, R. aureum or R. odoratum growing within one mile of plot and no other Ribes within 1500 feet. Must have names and addresses of consignor and consignee and contents marked on each package.

G. Must have names and addresses of consignor and consignee and contents marked on each package. Must have attached a permit tag from Oregon State Board of Horticulture bearing (1) serial number, (2) date of certificate issued to consignor by State inspector, (3) that under personal supervision of inspector said plants were immersed in a lime-sulphur solution.

PROVISIONS OF THE FEDERAL WHITE PINE BLISTER RUST QUARANTINE PERTAINING TO SHIPMENT OF HOST PLANTS MOVING FROM OREGON TO OTHER STATES.

1. European black currants are prohibited from moving interstate.

2. Five-needled pines and currant and gooseberry plants (except European black currant) from uninfected portion of Oregon must meet the requirements of A.

3. Only red, white and alpine currants and cultivated gooseberries can be shipped out of the infected counties of Oregon and they must meet the requirements of A, B, D and E.

UNITED STATES DEPARTMENT OF AGRICULTURE
Federal Horticultural Board

RESTRICTIONS ON INTERSTATE MOVEMENT OF
CULTIVATED RED AND WHITE CURRANT, MOUNTAIN CURRANT, AND CULTIVATED GOOSEBERRY PLANTS.

Extracts from Regulations supplemental to Notice of Quarantine No. 63.
Effective October 1, 1926.

Regulation 4. *

Except as hereinafter provided, currant and gooseberry plants other than European black currants shall not be moved or allowed to be moved interstate to points outside of any one of the infected States, as follows:

Connecticut	New Hampshire	Rhode Island
Maine	New Jersey	Vermont
Massachusetts	New York	Washington
Michigan	Oregon	Wisconsin
Minnesota	Pennsylvania	

Provided, That, with respect to interstate movement from the State of Oregon, this regulation is limited to the counties of Clatsop, Columbia, Lincoln, Polk, Tillamook, Washington, and Yamhill, in view of the fact that the State of Oregon maintains and enforces a quarantine against the intrastate movement of blister rust host plants out of the above-named counties, and otherwise provides and enforces such control measures as, in the judgment of the Secretary of Agriculture, are deemed adequate to effect the control and prevent the spread of white pine blister rust in the State of Oregon:

Provided further, That cultivated red and white currant, mountain currant, and cultivated gooseberry plants may be moved interstate from any one of the infected States or counties designated in this regulation during the period specified in paragraph (e) following, upon compliance with the requirements specified in Regulation 5 (c), (d), and (e), and with the requirements specified in paragraphs (a), (b), (c), and (d) following:

(a) That the said plants and the premises on which said plants were grown have been inspected during the period from August 15 to September 30 preceding the shipment (except that in the States of Oregon and Washington inspection shall be made in September or October preceding the shipment) by an inspector, and that said plants and premises are found to be free from white pine blister rust.

UNITED STATES DEPARTMENT OF AGRICULTURE
Federal Horticultural Board

RESTRICTIONS ON INTERSTATE MOVEMENT OF
CULTIVATED RED AND WHITE CURRANT, MOUNTAIN CURRANT, AND CULTIVATED GOOSEBERRY PLANTS.

Extracts from Regulations supplemental to Notice of Quarantine No.
Effective October 1, 1925.

* * * * * * * * * * * * * * * * * * * Regulation 4.

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Connecticut	New Hampshire	Rhode Island
Maine	New Jersey	Vermont
Massachusetts	New York	Washington
Michigan	Oregon	Wisconsin
Minnesota	Pennsylvania	

Provided, That, with respect to interstate movement from the State of Oregon, this regulation is limited to the counties of Clatsop, Columbia, Lincoln, Polk, Tillamook, Washington, and Yamhill, in view of the fact that the State of Oregon maintains and enforces a quarantine against the intrastate movement of blister rust host plants out of the above-named counties, and otherwise provides and enforces such control measures as, in the judgment of the Secretary of Agriculture, are deemed adequate to effect the control and prevent the spread of white pine blister rust in the State of Oregon;

Provided further, That cultivated red and white currant, mountain currant, and cultivated gooseberry plants may be moved interstate from any one of the infected States or counties designated in this regulation during the period specified in paragraph (e) following, upon compliance with the requirements specified in Regulation 5 (c), (d), and (e), and with the requirements specified in paragraphs (a), (b), (c), and (d) following:

(a) That the said plants and the premises on which said plants were grown have been inspected during the period from August 15 to September 30 preceding the shipment (except that in the States of Oregon and Washington inspection shall be made in September or October preceding the shipment) by an inspector, and that said plants and premises are found to be free from white pine blister rust.

(b) That there exist no European black currants within a radius of one mile of the plot where said plants were grown and that the vicinity within one mile radius of said plot was carefully scouted for white pine blister rust during the period from August 15 to September 30 preceding the shipment (except that in the States of Washington and Oregon inspection shall be made in September or October preceding the shipment) and that no blister rust infection was found.

(c) That the said plants when shipped are in a dormant and defoliated condition.

(d) That the whole of said plants except the roots have been immersed before shipment in a solution consisting of one part concentrated lime-sulphur testing not less than 32 degrees Baume to eight parts water, the dilute solution to test not less than 4.5 degrees Baume.

(e) That the said plants shall be moved interstate from the said infected States or counties only between October 1 of the year of inspection and May 15 of the year following except that in Oregon and Washington the said plants shall be moved only between November 1 of the year of inspection and April 15 of the year following.

Regulation 5. * * * * * * * * * * * * * * * * * *

(c) All kinds of currant and gooseberry plants (other than European black currants) moved from any State: Each car, box, bale, or other container of currant and gooseberry plants other than European black currants, moved interstate from any State shall be plainly marked to show the name and address of the consignor, the name and address of the consignee, and the contents, as currant or gooseberry plants; and each such shipment shall bear on the outside of the container a certificate duly executed by the State nursery inspector or other responsible plant quarantine official of the State in which said plants were grown, certifying that the plants in question and the premises on which said plants were grown were officially inspected within one year of the time of shipment (giving date of inspection) and found to be free from white pine blister rust; each such shipment moved interstate into any State having a legally established blister rust control area shall also bear on the outside of the container a permit issued by the nursery inspector of such State or by other responsible plant quarantine official thereof.

(d) Cultivated red and white currant, mountain currant, and cultivated gooseberry plants moved from fourteen infected States: Each car, box, bale, or other container of cultivated red and white currant, mountain currant, and cultivated gooseberry plants moved interstate from the infected States and counties designated in Regulation 4 shall be subject to requirements specified in paragraph (c) of this regulation and, in addition, shall have attached to the outside of the container a permit tag bearing:

(1) The serial number of the permit issued by the Federal Horticultural Board to the consignor of the shipment on an application signed and submitted by said consignor agreeing to observe the conditions governing the use of said permit as specified in the application therefor.

(2) The date of the certificate issued to the consignor of such shipment by an inspector of the Federal Horticultural Board, certifying that the requirements of Regulation 4 (a) and (b) have been complied with; and such certificate shall be valid only between October 1 of the year of inspection and May 15 of the year following, except that, in Oregon and Washinton, the said certificate shall be valid only between Nobember 1 of the year of inspection and April 15 of the year following.

(3) A certificate from the consignor stating that the cultivated red and white currant, mountain currant, and cultivated gooseberry plants in said shipment are the plants to which the Federal permit and inspection certificate, referred to on the permit tag accompanying the said shipment, apply; and that before shipment said plants were immersed in a solution consisting of one part concentrated lime-sulphur testing not less than 32 degrees Baume to eight parts water, the dilute solution to test not less than 4.5 degrees Baume.

Provided, That the use of the said permit tag is prohibited except during the period of time specified in Regulation 4 (e), nor shall said tag be used when the certificate of inspection is withdrawn in accordance with Regulation 7 or when, after the certificate of inspection has been issued, conditions on the premises to which said inspection certificate applies are found not to conform to the requirements of Regulation 4 (a) and (b).

(e) Carload and bulk shipments: With respect to paragraphs (a), (b), (c), and (d) of this regulation, when the plants specified thereunder are moved in carload or other bulk shipments, the Federal and State permits and certificates required thereby shall accompany the waybills, conductors' manifests, memoranda, or bills of lading, or, in the case of truck or other road vehicle, such permits and certificates shall accompany the vehicle.

OREGON STATE BOARD OF HORTICULTURE
Office at Portland
306 Fitzpatrick Building.

Board Members
H. C. Atwell, Forest Grove
Chas. A. Park . . . . Salem
A. C. Allen . . . . Medford
T. A. Sammis, Jr. The Dalles
H. H. Weatherspoon. . Elgin

Officers
Chas. A. Park...President
Chas. A. Cole ..Secretary

J. E. Stansbery, State Inspector

Botany Department, O.A.C.,
Corvallis, Oregon,
October 1, 1926.

Postmaster,

Dear Sir:

We wish to call your attention to Federal Quarantine No. 63 and Oregon State Quarantine No. 18. These quarantines were promulgated to protect Oregon's white and sugar pine forests, and, under regulations, permit the shipment of cultivated red and white currant and gooseberry plants.

You can be of material assistance in enforcing these regulations by seeing that all shipments of nursery stock bear the required inspection tags.

It is required under Section 478 Postal Laws and Regulations that all packages containing nursery stock, vines, shrubs, etc., bear an inspection tag signed by a State or Federal inspector, to be admitted to the mails.

The shipper must declare the contents of the package.

Nursery stock can not be considered merchandise.

Do not ship nursery stock that does not bear an inspection certificate.

Thanking you for your cooperation, we are,

Yours respectfully,

OREGON STATE BOARD OF HORTICULTURE

By

Chas. A. Cole,
Secretary.

OREGON STATE BOARD OF HORTICULTURE
Office at Portland
306 Fitzpatrick Building.

Board Members
[illegible] Atwell, Forest Grove
Chas. A. Park . . . . Salem
[illegible] C. Allen . . . . Medford
[illegible] Samuels, Jr. The Dalles
[illegible] Weatherspoon. . Elgin

Officers
Chas. A. Park...President
Chas. A. Cole ..Secretary

J. E. Stansbery, State Inspector

Botany Department, O.A.C.,
Corvallis, Oregon,
October 1, 1926.

Postmaster,

Dear Sir:

We wish to call your attention to Federal Quarantine No. 63 and Oregon State Quarantine No. 13. These quarantines were promulgated to protect Oregon's white and sugar pine forests, and, under regulations, permit the shipment of cultivated red and white currant and gooseberry plants.

You can be of material assistance in enforcing these regulations by seeing that all shipments of nursery stock bear the required inspection tags.

It is required under Section 478 Postal Laws and Regulations that all packages containing nursery stock, vines, shrubs, etc., bear an inspection tag signed by a State or Federal inspector, to be admitted to the mails.

The shipper must declare the contents of the package.

Nursery stock can not be considered merchandise.

Do not ship nursery stock that does not bear an inspection certificate.

Thanking you for your cooperation, we are,

Yours respectfully,

OREGON STATE BOARD OF HORTICULTURE

By

Chas. A. Cole,
Secretary.

VI. Nursery Inspection in Oregon According to Requirements of Federal Quarantine No. 63 and State Quarantine No. 18.

by

E. M. Hornibrook.

The inspection work was carried on by T. D. Mallery from July 1 to August 20, 1926. F. P. Sipe took up the work August 20 and carried it on until October 1, 1926. October 1, E. M. Hornibrook came on the job and carried on the inspection work until December 23 when it was dropped for the year.

Hornibrook spent part of the time interviewing postmasters, freight and express agents concerning the quarantine regulations and inspecting freight, express and parcel post shipments of shrubbery and nursery stock.

Table II.

Table - Showing Number of nurseries by counties in Quarantined territory, number of currants, gooseberries or white pine grown and number of Commercial Plantings.

Counties	No. of Nurseries without currants Gooseberries or Pines	No. of Nurseries growing currants, Gooseberries or Pines	No. bushes or trees Currant	Gooseberries	Pine	Total No Commer. Plantings.	Total Acreage in Commercial Plantings
Columbia	0						
Clatsop	0						
Columbia	1	0	0	0	0	0	0
Washington	11	5	32,693	11,700	183*		
Tillamook	0						
Yamhill	10	1		60		2	$2\frac{1}{2}$
Polk	2	0				32	75
Lincoln	0						
Total	24	6	32,693	11,760	183	34	$77\frac{1}{2}$

* Pines were destroyed.

Number of nurseries by counties, in counties not under quarantine and number of currants, gooseberries or white pine grown;

Table III.

Counties	No. Nurseries without Currants, Gooseberries	No Nurseries growing Currants, Gooseberries or Pines	No. bushes or Trees			Remarks
			Currants	Gooseberries	Pine	
Benton	2	0		0	0	
Clackamas	9	1	2100	100	51	Have been destroyed
Douglas	1	0	0	0	0	
Hood River	3	0	0	0	0	
Jackson	0	1	50	50	0	
Lane	3	1	450			
Linn	2	1	2,000	2,000	0	
Marion	10	18	31,150	31.555	0	
Multnomah	34	16	28,207	18,225	14	
Umatilla	0	1	5,000	0	0	
Union	1					
Total	65	29	68,957	51,930	65	

In the nursery inspection certain perscribed forms were used, copies of which are included in this report.

Not all of the nurseries in the quarantined counties applied for Federal Horticultural Board permits. Some of those who failed to apply for a permit destroyed their bushes before the season was over. The others were watched to see that they made no violations of Federal Quarantine 63 or State quarantine 18.

List of Nurseries Obtaining Federal Horticultural Board Permits.

Nursery	Location	County	F. H. Board Permit No.
Oregon Nursery Co.	Crenco, Ore.	Washington	1
Carlton Nursery Co.	Carlton, Ore.	Washington & Yamhill	2
The Brooks Nursery Co.	Lafayette, Ore.	Yamhill	3
Lafayette Nursery Co.	Lafayette, Ore.	Yamhill	4

Cooperation of County Fruit Inspectors With the Federal Horticultural Board Inspectors.

In general the county fruit inspectors were very good in cooperating and giving aid and information whenever it was possible.

Mr. J. R. Beck, County Agent and fruit inspector for Polk County was transferred from Lincoln County in October. He did not get things arranged to render much service during inspection season. In previous years most of the inspection work in Polk County had been carried on by Mr. Van Trump, County fruit inspector for Marion County.

Mr. LaFollette, inspector for Washington County, was very good in giving information and in carrying on the quarantine inspection work.

Mr. Vincent, inspector for Yamhill, was very good about cooperating and took a great interest in the quarantine inspection work.

There was only one nursery in Columbia County and this is not certified by the State so most of the work there consisted in inspection of incoming shipments and miscellaneous outgoing shipments of shrubbery. The appropriation for inspection work in Columbia County is very small so that the inspector, Mr. Lynch is limited in the extent of his work.

There are no nurseries in Clatsop, Tillamook and Lincoln counties. For that reason inspection in these counties consisted only of watching for incoming shipments or probable outgoing shipments of wild shrubbery.

C. S. Dow, County fruit inspector for Clatsop County inspects all incoming and outgoing materials as far as it can be caught at Astoria or Seaside.

W. D. Pine, inspector for Tillamook County gave any desired aid or information.

M. J. Conklin is county agent for Lincoln County. He is a new man and unfamiliar with conditions in Lincoln County. He has, however, taken over the inspection work. This consists largely in native shrubbery and trees shipped by tourists and ranchers.

J. E. Stansbery, state Horticultural Inspector and Mr. Walker, inspector for Multnomah County, were of great assistance and were interested in the quarantine inspection work.

The two following forms used in the nursery inspection work.

NURSERY INSPECTION REPORT

NAME________________________ P.O. ADDRESS____________________ COUNTY ______________

HOW REACHED

NAME AND TITLE OF PARTY INTERVIEWED____

CHARACTER OF NURSERY

NUMBER AND KIND OF WHITE PINE   AGE   CONDITION

DOES NURSERY PLAN ON SELLING WHITE PINE?______

NATIVE OR CULTIVATED RIBES PRESENT   PROXIMITY   ABUNDANCE

RIBES SPECIES UNDER CULTIVATION   NUMBER BUSHES   NUMBER CUTTINGS

DOES NURSERY GROW ITS OWN SUPPLY OF RIBES?___IF NOT WHERE ARE THEY OBTAINED?____

NATIVE OR CULTIVATED WHITE PINES IN VICINITY?   RELATIVE PROXMITY   ADBUNDANCE

BLISTER RUST PRESENT?_______________

COUNTY COOPERATIVE WORK REPORT

COUNTY____________________________DATES VISITED____________________________

COUNTY AGENT____________________________ADDRESS____________________________

COUNTY FRUIT INSPECTOR____________________ADDRESS____________________________

OTHER OFFICIALS WITH TITLES AND ADDRESSES

OTHER MEN OF INFLUENCE WITH OFFICIAL TITLES AND ADDRESSES

NURSERIES INSPECTED ADDRESSES

INSPECTION POINTS:

#1 HOST PLANTS	ABUNDANCE
EXPOSURE	DISTANCE TO PINES
LOCATION	HOW REACHED
#2 HOST PLANT	ABUNDANCE
EXPOSURE	DISTANCE TO WHITE PINES
LOCATION	HOW REACHED
#3 HOST PLANTS	ADBUNDANCE
EXPOSURE	DISTANCE TO WHITE PINES
LOCATION	HOW REACHED

VII. Inspection of Native Host Plants In the Cascade Region.

by

F. P. Sipe

Region covered. The region covered by this series of studies was in general the crest of the Cascades from the Columbia River south to Crater Lake, Oregon. The general route was along the so-called Sky-line Trail, but in many cases, where this trail led through treeless ground or what seemed otherwise profitless to study, other trails were taken. Most of the territory covered was west of the crest, as little or no white pine is found east of the crest. The total miles covered were 663.

The Ribes found in this region are listed in the following table. In order to give an idea of the general distribution of each species, the whole area covered is divided up into several smaller areas, and the Ribes for each area listed. See map for definite idea of each area. Numbers signify time recorded on reconnaissance sheets.

Table IV.

Area	R. vis.	R. cer.	R. lac.	R. sang.	R. brac.	R. pet.	R. acer.	G. lobbii	G. watson.	G. cru.	G. iner.	G. bino.	G. div.	R. triste	R. erythro.
Crater Lake to Odell Lake	2	11	2									1			1
Odell Lake to Elk Lake	11	8	16	7	2	1		3		1			1		1
Elk Lake to McKenzie Pass	3	4	2	1											
McKenzie Pass to Marion Lake	7	4	8					2							
Marion Lake to Breitenbush Lake	5		10	8	1			4							
Breitenbush Lake to Lemiti region	1		5	2	2			2							
Lemiti to Clear Lake Meadows			3		1									1	
Clear Lake to Columbia River	3		12	6	9		2	1	2					2	

Amount and Distribution of White Pine.

Western white pine (Pinus monticola) occurs quite generally throught a belt beginning at the crest of the Cascades (in Oregon) and extending about 15 or 20 miles west; and extending from the Columbia River south to the Crater Lake region, where it merges into the sugar Pine regions of southern Oregon. In many places throughout this area the white pine is not found, and from no stand at all it may vary to a stand comprising over 50% of the trees. In no place was white pine found in a pure stand. Areas showing most white pine are outlined as follows.

1. About Odell Lake, white pine 5% to 10%, associated with lodge pole and hemlock.

2. Southeast and north of Box Canyon R.S. (Cascade National Forest) with about 10% white pine, associated with Douglas fir.

3. Northwest of Horse Lake, along the Horse Creek Trail, (Cascade National Forest) and southwest of Horse Lake R.S., about Horse Mountain, 10% to 40% white pine.

4. An area west of the Husband Mountain, (Cascade National Forest) along the Foley Ridge Trail, with 20% to 25% white pine.

5. An area about three miles wide, from south of Clear Lake north to Pine Ridge (Santiam National Forest) containing 5% up to 20% and even 50% in places, of white pine, associated with Douglas fir, lodgepole pine and hemlock.

6. Area northeast and northwest of Marion Lake 5% white pine timber and 50% in an old burn west of the lake.

7. Headwaters of the south fork of the Breitenbush River (Santiam National Forest) an extensive planted area of white pine over an old burn, the white pine doing very well.

8. Area about 4 miles wide, from the region of Peavine Mountain north to Mount Hood Loop Road. White pine seems to be scattered through all this area, associated with hemlock, lodgepole pine, Douglas fir and fir. White pine varies from none to 5% up to 20% in places.

The white bark pine (Pinus albicaulis) is an alpine species, found generally distributed on the higher ridges and alpine meadows of the Cascades. It is small and of no probable economic importance, but being susceptible to blister rust must be considered a possible means of disseminating the disease.

The following table gives the Forest Service estimates of timber by counties for the National Forest land in Oregon.

White and Sugar Pine Statistics for the National Forests of Oregon:

Table No. V.

Summary of Estimates

National Forest	Net Acres Forest Land	Total Stand F.B.M. (all species)	Sugar Pine F.B.M.	West. W. Pine F.B.M.
Cascade	1,017,979	23,539,613	56,163	151,182
Crater	805,061	8,421,616	232,765	258,996
Deschutes	1,283,308	7,595,512	67,391	52,398
Fremont	849,501	6,597,280	14,950	8,125
Malheur	1,048,666	9,665,797	none	none
Ochoco	719,206	6,571,620	none	none
Oregon	1,053,700	14,105,653	none	91,319
Santiam	607,097	12,023,499	none	106,611
Siskiyou	1,001,816	9,283,093	483,651	5,000
Siuslau	544,693	5,919,080	none	none
Umatilla	915,393	3,351,826	none	none
Umpqua	1,007,291	23,594,201	729,441	166,209
Wallowa	957,419	1,800,130	none	none
Whitman	1,313,931	5,864,758	none	1,083
Klamath	5,280	122,682	22,720	2,367
Totals for all Nation Forests in Oregon	13,130,831	138,606,432	1,607,086	843,290

The combined estimates of white and sugar pine show nearly $2\frac{1}{2}$ billion board feet on the National Forest land of Oregon. (This estimated timber stand in F.B.M. based on extensive timber reconnaissance by U.S. Forest Service.)

Inspection Points.

Several inspection points were established and described in the field notes as to location, Ribes present, and means of reaching. In selecting these points the things kept in mind were (1) ease of reaching, (2) probable susceptibility of Ribes to blister rust infection, (3) exposure of the area to possibility to receiving wind-distributed spores. Inspection points were established at the following points. (See map for distribution.)

1. Near Government Camp, Mt. Hood, on Loop Road at Iron Creek, (*R. bracteosum.*)
2. Camp grounds, Lost Lake, Mt. Hood, (*R. bracteosum.*)
3. Oak Grove fork of the Clackamas River, from Oak Grove R.S. east along river to Timothy meadows, (*R. bracteosum.*)
4. South fork of the Breitenbush River, about 8 miles southeast of Breitenbush Hot Springs, in the plantation area, (*R. bracteosum.*)
5. Detroit, Oregon along the highway, small streams crossing the road, to about three miles west, (*R. bracteosum.*)
6. Belknap Springs, McKenzie River Highway.
7. Foley Ridge Trail, Cascade Forest, along Gold Creek about 14 miles from McKenzie River, (*R. lacustre.*)
8. Near junction of Elk Creek and the south fork of the McKenzie River, (*R. lacustre.*)
9. South shores of Odell Lake, (*R. lacustre, R. viscosissimum.*)
10. On Tumalo Creek ten miles west of Bend, on *R. petiolare.*)

Other inspection points were established in the foothills of the Cascades in connection with the nursery inspection work later in the season.

Inspection Points

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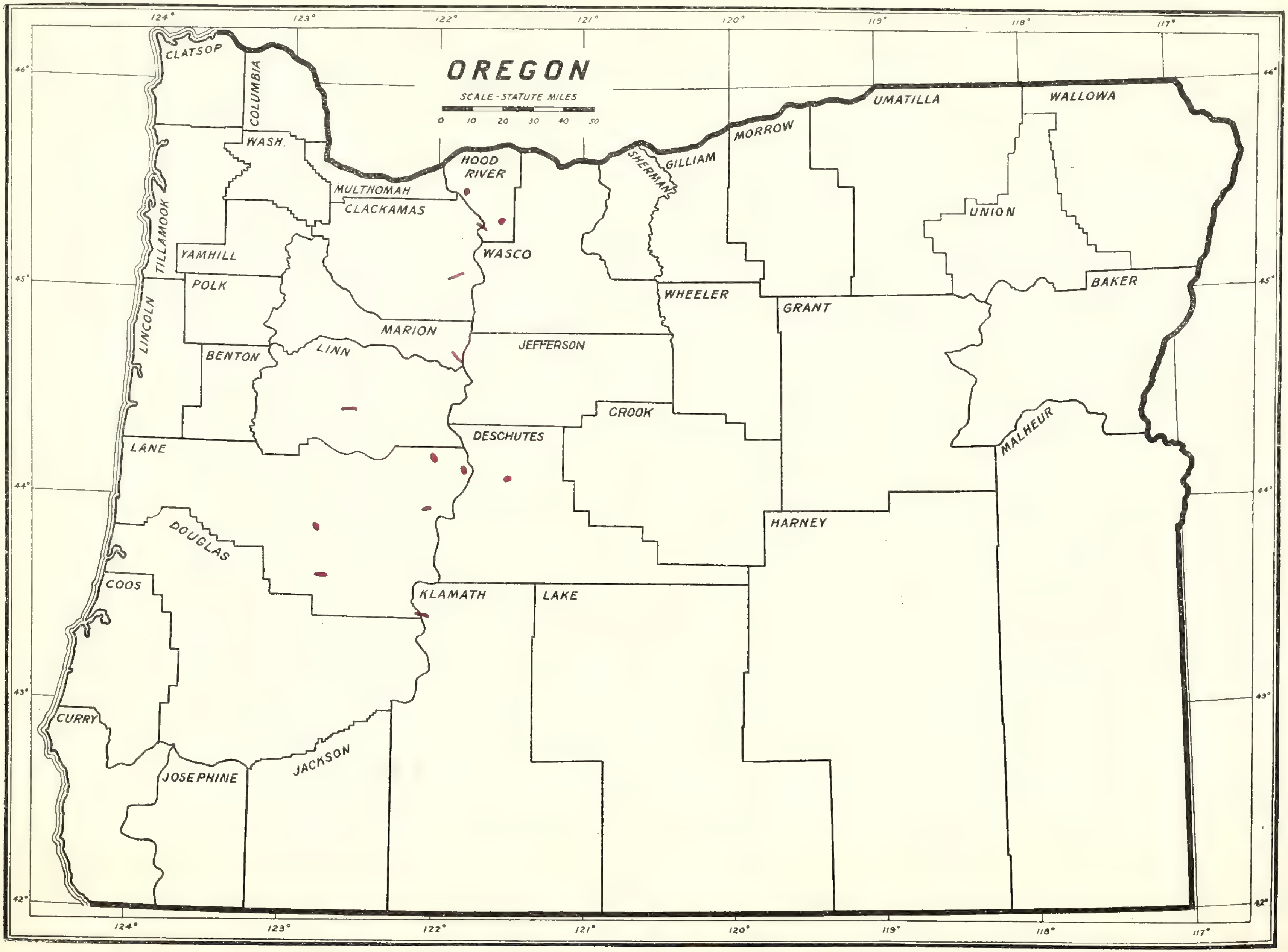

July 1, 1919.

Plantation Areas in the Cascades National Forests, Oregon.

The plantation areas are of particular interest, as many of them contain some species of white pine (*P. monticola* or *P. lambertiana.*) Where examined by the blister rust crews they were found to contain vigorous white pine and associated with them, *R. bracteosum.* The Following table gives more complete data concerning the plantations now existing in the Cascades in Oregon that have white pines. (Data secured from the National Forest Service.)

Location and Acreage of Plantations Containing Five-Needle Pines On National Forests in Oregon.

J. F. K. 12/28/26.

Forest	Project	Location	Date Planted	Subdivision No.	Species	Area Acres
Crater	Tallowbox	Sec.12,T.39 S., R. 4 W.	1917	P-6, 9	P. ponderosa & P. lambertiana	15.5
Mt. Hood	Still Creek	Sec.2,T.4 S., R. 8 E, Sec.36,T.3 S., R. 8 E.	1915	P-4, 5	P. monticola & P. taxifolia	60
		Sec.25,26,35,36,T. 3 S., R. 8 E.	1918	P-2, 3	P. monticola & P. taxifolia	290
		Sec.26,36, T. 3 S., R. 8 E.	1919	P-6, 7	P. monticolia & A. nobilis & A. amabilis	275
Santiam	Battleaxe	Sec.25,26,35,36,T.8 S., R. 5E. Sec.1,2,T. 9 S., R. 5 E.	1918	P-1,2,3,	P. monticola & P. taxifolia	489
	Breitenbush	Sec.31,32,T. 9 S., R. 8 E. Sec.5,6,T.10 S., R. 8 E.	1919	P-1	P. monticola & A. nobilis	56
		Sec.5.6. T.10 S., R. 8 E. Sec.31,32, T., 9 S., R. 8 E.	1920	P-2, 4	P. monticola, P. taxifolia, A. nobilis	272
		Sec.31,32, T. 9 S., R. 8 E.	1921	P-6,7,8,9	P. monticola & P. taxifolia	357
	7 Mile Hill	Sec.6,7, T.14 S., R. 6 E. Sec.1,11,T.14 S., R. 5 E.	1916	P-11,12 13-14	P. monticola, P. taxifolia & A. nobilis	165
Siskiyou	Briggs Creek	Sec. 18,T. 36 S., R. 8 W.	1911	Z-3	P. lambertiana	[illegible].75
		Sec. 16,T. 36 S., R. 8 W.	1913	Z-23	P. lambertiana & P. ponderosa	28
Siuslaw	Mt. Hebo	Sec.23,24,T. 4 S., R. 9 W.	1913	P-3, 5 6	P. strobus, resinosa Picea excelsa.	208
		Sec.23,T. 4 S., R. 9 W.	1914	P-5	P. monticola	0.25
			Total Acres			2217.50

Areas Suitable for Local Control[1]

More intensive studies of certain areas would be desireable before designating areas suitable for local control. The whole question of forest succession under modern forest control conditions, particularly for white pine, has not been studied for this area, so far as the writer could find out. Therefore predicting what will happen in the future must contain a large element of speculation. A careful ecological study of this area would be of great help in clearing up or at least throwing some light on this subject.

The following areas seemed apparently most suited for local control.

1. The area from Clackamas Lake region to Mt. Hood. The white pine is scattered but in places some very good timber is found, and good reproduction is coming in in many favorable places.
2. Along the headwaters of Still Creek, southwest of Government Camp, a plantation of about 650 acres with much white pine in good condition, and associated with R. bracteosum, R. lacustre and R. sanguineum.
3. Horse Thief Meadows, east of Mt. Hood, on the Loop Road, contains promising areas of white pine reproduction.
4. Big meadows to Pine Ridge (Santiam National Forest) contains many patches with white pine up to 50% and in good growing condition. R. lacustre fairly common.
5. Area west of the Husband Mt. (Cascade National Forest) along the Foley Ridge trail contains from 5% to 25% white pine, mostly large timber (age class 100-200). R. lacustre scattered.
6. Breitenbush Plantation. This plantation was studied by blister rust crew and found to contain white pine in very good condition. Associated with it was R. bracteosum along the small streams down the steep slopes. Stream eradication would probably clean out all Ribes.

White Pine Stand by Areas.

The following map shows more graphically the amount and distribution of white pine in the Mt. Hood and Santiam Forests. Figures are from extensive reconnaissance by the Forest Service. Figures given are M. Feet B.M.

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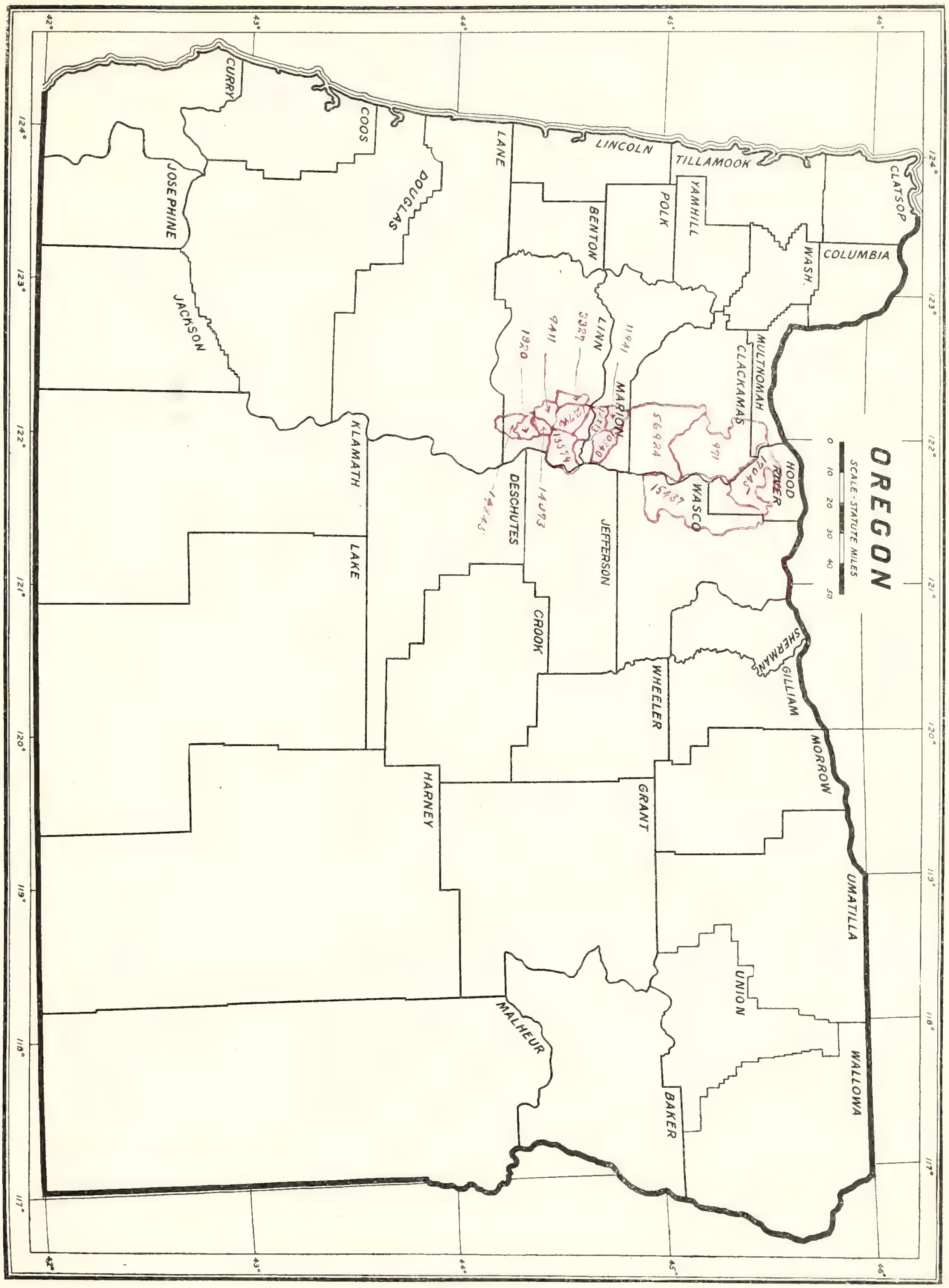
July 1, 1919.

U. S. Department of Agriculture.



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White Pine Stands.

Estimated white pine in F. B.M. from the extensive timber reconnaissance of the Forest Service.

Insect Enemies and Diseases of White Pine.

In most places observed the white pine was not seriously affected by insects or diseases. In a few places, however, the white pine was being much damaged.

1. Between Big Meadows and Pine Ridge (Santiam National Forest) the white pine of all sizes and ages was being attacked and killed by the beetle, Denroctonus monticola.

2. An area of dying and dead pines, about 15 miles from Detroit, on the Detroit-Pamelia Lake trail, was studied, but no cause was located for the condition of the trees. This area is to be studied further by blister rust workers at the earliest possible time.

3. In the region of Horse Thief Meadows, southeast of Mt. Hood, an infection of the beetle, Dentroctonus monticola, was found. Spot infections, two or three trees in a group.

4. Packsaddle Mountain region, Denroctonus monticola was found infecting the white pine in spots.

5. Upper McKenzie (South fork) near mouth of Elk Creek, Dendroctonus monticola spot infection.

Scleroderris treleaseii was found affecting smaller branches and twigs in white pine in places. Collections were made near Pine Ridge, shores of Marion Lake, west of Government Camp on the Mt. Hood Loop road.

Future Possibilities as a White Pine Area.

In many places through the higher regions of the Cascades, indications point to a favorable development of white pine areas in the future. Some observations leading to this conclusion are as follows:

In the region about Olallie Butte, white pine is growing with lodgepole pine. White pine is noticeably a faster growing tree than lodgepole, and with efficient fire protection in the future, the chances seem strongly in favor of these regions being taken by white pine, which is quite thickly scattered there now.

In large areas about Clackamas Lake white pine is scattered through forests of hemlock and fir. It is generally believed by forestry people that hemlock will crowd out white pine, though no scientific studies have been carried out to prove this point, at least for the Cascade region. Future developments cannot be judged entirely by the past, as fires will be much reduced in the future, and lumbering off of trees will introduce a new factor not entering in the past. White pine is well established and producing many large and vigorous trees. When the hemlock is lumbered out, a succession very different from the past may result.

The same may be said regarding an extensive area from Clear Lake (Santiam National Forest) north to beyond Pine Ridge (about 20 miles) and possibly four to five miles wide, where white pine is growing with Douglas fir and lodgepole pine.

The Forest Service is recognizing the possibilities of this region for white pine and have made plantings in several places. The plantings studied by blister rust crews showed the white pine to be in very vigorous condition.

The following form was used in the course of this field work, in addition to the standard reconnaissance form, W.F-24-BRC-6-12-26.

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The following form was used in the course of this field work, in addition to the standard reconnaissance form, W.T-24-BRC-5-12-25.

Area #____. T___R___S___. Direction_____. Length_____.

TREES. Especially white pines.

Species	Age cl.	Relative abundance	Condition	Remarks

SHRUBS. Especially Ribes

Species	Condition	Abundance	Height	Col. #	Remarks

REPRODUCTION. Especially white pine.

Species	Height	Av. age	Condition	Abundance	Remarks

DISEASES AND INSECTS.

Name	Host	Col. #	Effect	Remarks

Inspection point. Map #. ______. Ribes sp. ____________________
Give in detail how point may be reached ________________________

Is area suitable for white pine? ________________________
Why? ____

Description of area studied. (Rugged, smooth, rocky, steep-slopes, burns, deep canyons, lava flows, glacial drifts, plateaus, open parks, meadows, lakes, etc.)

VIII. Established Inspection Points.

These were established chiefly to benefit the State men in their inspection. The Ribes in practically every case is R. bracteosum. The points for the most part are accessible and well exposed. The blister rust crews inspected in hundreds of other places but this extended work cannot be expected of the State.

For points along the Cascades see report on inspection of Native Host Plants in the Cascade Region.

Multnomah County

Latourelle Falls along Columbia River Highway, 27 miles east of Portland.
Multnomah Falls, along Columbia River Highway, 35 miles east of Portland.
Oneonta Gorge, south of Highway along Columbia River Highway.

Clackamas County

Cedar Creek and Sandy River Bridge near Sandy.
Alder Creek and Wild Cat Creek.
Salmon on Salmon River.
Welches Summer Resort, 2 miles south of Mount Hood Loop Highway.

Columbia County

Along the Nehalim Highway for many miles between Vernonia and Mist.
Along the Lower Columbia River Highway west of Rainier Ribes are abundant for many miles.

Clatsop County

The points placed under special observation here are tn those at Astoria and Seaside. At Astoria there are white pines in two places. One at the Astoria water works has R. bracteosum in abundance nearby. At the old Erickson Nursery, no longer a nursery are four white pines of different species. Near there are abundant R. bracteosum.
To the south of Seaside R. bracteosum is abundant.
Another point kept in observation is the point where Mallery found blister rust in 1925. This is on Gnat Creek where the Lower Columbia River Highway crosses it.
R. bracteosum is abundant between Seaside and the County line to the south along the highway.

Tillamock County.

At Wheeler at the old infection point.
At Neskowin R. bracteosum is abundant.
Between Hebo and the County line to the east along the highway to McMinnville.
Along the lower Wilson River Road from 6-15 miles from Tillamook.

Washington County

Gales Creek -- Gossularia divaricata near the Gales Creek bridge. Also R. bracteosum short distance up the stream.
One-fourth to one-half mile between Gales Creek Fish hatchery and Soda Springs Camp.
Scroggins Creek on Scott's Ranch 5 miles from Highway. Leave highway between Forest Grove and Cherry Valley Road.

Yamhill County

Panther Creek. Stop at bridge and scout one mile up stream from bridge.
Baker Creek between Falls and Sawmill, also, one mile along Baker Creek below Sawmill.
North of Willamina along Willamina Creek.

Polk County

New Grand Ronde -- G. divaricata.
Black Rock -- R. bracteosum.

Lincoln County

R. bracteosum is abundant in places along the highway to Corvallis between Newport and the east County line.
R. bracteosum is abundant below Alsea along the Waldport Highway.
R. bracteosum is abundant on many of the small streams along the coast between Agate Beach and Kernville along the Highway.

Benton County

Take side road south of highway one mile west of Blodgett. R. bracteosum scattering and G. divaricata abundant.
Along highway above Alsea for several miles.

Marion County

On small streams entering the Santiam from 5 to 10 miles below Detroit, Oregon.
See also Cascade Reconnaissance Report.

Linn County

A small amount of R. bracteosum on Thomas Creek 6 miles east of Scio.
South Santiam River for several miles above and below Cascadia.
On Lebanon-Cascadia Road, 21.1 miles from Lebanon, along River. - R. bracteosum.
On Lebanon-Cascadia Road, 21.1 miles from Lebanon, on forest service road. R. bracteosum.

Lane County

Belknap Springs on McKenzie Highway
On Junction City-Florence road, 9 miles west of Cheshire, along the Long Tom River. R. bracteosum.
Southeast of Goshen, about 10 miles, in edge of Cascades. R. bracteosum.
East of Cottage Grove Road to Diston, .7 miles east of Diston, along stream. R. bracteosum.

Douglas County

From Canyonville south on highway up Canyon Creek to crest of the divide. R. bracteosum.

Deschutes County

On Tumalo Creek ten miles west of Bend. R. petiolare.

Inspection points in the more southern counties have not been definitely located.

General Location of Inspection Points.

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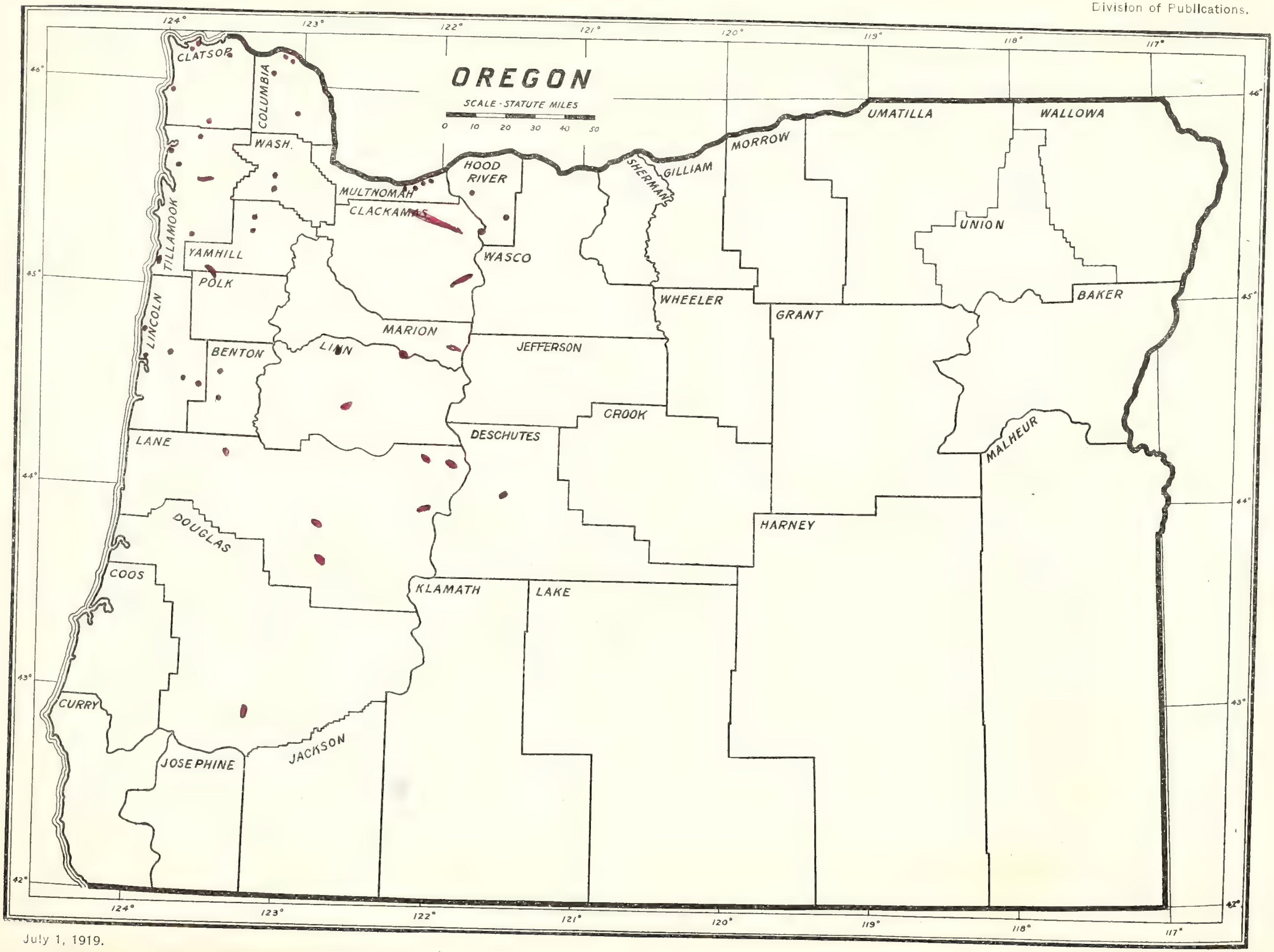

July 1, 1919.

IX. Ribes Reproduction in Burns Near Detroit, Oregon

The studies made of Ribes in burns were altogether too limited to bear weight. The following data were taken on a seven-year old burn above Detroit on the Santiam River. This burn extended along a small stream and up to the summit of the ridge. The entire burn was a general south exposure with secondary east and west exposures along the small stream. The burn had taken some timber about 25 or 30 years old next to the small stream and had spread into dense mature timber, practically all Douglas fir, higher up on the slope. Erosion had been more pronounced in the younger burn. The only Ribes found were in the burn in the 25 or 30 year old timber. Here we laid out a plot about 100 by 200 feet. Ribes sanguineum was the only Ribes present. In this plot were found two plants which had evidently sprung up after the fire the season it occurred as they showed 7 rings, 28 showed 6 rings, 21 five rings, 5 four rings, 15 three rings, 10 two rings and 4 one ring. There were also noted three bushes which had sprouted from large roots the year following the fire.

After obtaining these data we went up the slope into the region where the fire had gone into mature timber. Here we found no Ribes of any kind. We covered a distance of at least two miles in a circle in this mature timber burn with the same result.

We also examined an old 1910 burn along the bottom land along the Santiam. Here Ribes both R. sanguienum and Grossularia lobbii were abundant.

Nothing was conclusive in the plot counts. It appeared that the old crowns had sprouted and probably seeded the year following the fire. Thus it was impossible to tell whether young plants came from seeds in the duff or from a new crop. It appears certain from the abundance of 6 year old plants that some must have come from the duff. These, however, were not necessarily seed which had been stored for more than the one season as the old bushes could account for abundant seed in one or two seasons before the fire.

The conditions in the burns where there had been mature timber were not essentially different from those in the region where we found the Ribes. There was plenty of mineral soil exposed and the site in every way looked as favorable for Ribes as the other. It seemed evident that if Ribes were ever present the forest had completely shaded them out so long ago that seeds in the duff had died. This region also indicates that dispersal by birds is not general or abundant.

The old burn in the valley below had been burned several seasons after logging operations in 1909 and 1911. Ribes here were abundant where originally they had been totally suppressed. (This is shown by similar areas of the very dense bottom land timber.) There was no way of ascertaining the number which had sprouted from seeds in the duff as gravity and erosion could account for this being abundantly seeded.

There are many regions in the Cascades where the timber has been burned off for years where there is no evidence of Ribes or they are so few as to be difficult to locate. Evidently R. sanguineum is at times totally suppressed by a forest and the process of seeding by squirrels and birds must be extremely slow.

Erosion is undoubtedly the major agent in Ribes seed dispersal.

X. Recommendations for Future Work.

Nursery and Inspection Work

Certain kinds of work have settled themselves down to routine. Nursery inspection should be continued as usual with special effort to educate and obligate the State force in the work. The inspection of the established inspection points should be done at the same time as the nursery inspection and by the same forces. It will, however, be some years before this work can be definitely and finally assigned to the State people. Much of it will need to be done by our men for some years.

Quarantine.

Quarantine 63 has not proved difficult of enforcement in the State and the force such as we had in the fall should be adequate. Something, however, should be done during the flowering season of _R. sanguineum_ to prevent its free passage across the Columbia River. Quarantine here has been a joke in the past and as the disease intensifies in Washington the danger assumes greater proportions. It seems little short of nonsense to spend thousands of dollars in inspection of dormant nursery stock to see that it is dipped and other details seen to and allow fresh bushes to come in by the thousands from diseased territory at a season when uredinea must be in excellent condition. There can be no doubt about, not the possibility, but probability of bouquets being picked in regions like Chico where infected leaved are bound to be numerous and brought directly into Portland or other parts of Oregon.

There is more danger there than in anything outside white pine shipments for artificial spread of the rust. The interstate bridge has never been watched except on Sundays and holidays and not adequately so on those days. The bridges and ferries should be properly posted by the Federal Horticultural Board. Signs with paintings of the red flowering currant and letters easily read at a hundred yards should be used. Places like Chico should also be glaringly posted.

Inspection for the Diesease.

In connection with the inspection for the disease, outposts of the pines should be definitely located. The intense scouting should continue. It will be well to supplement the Oregon scouting with careful scouting in Western Washington. This can best be done in the fall when intensification on Ribes may indicate the proximity of pine infection.

X. Recommendations for Future Work.

Nursery and Inspection Work

Certain kinds of work have settled themselves down to routine. Nursery inspection should be continued as usual with special effort to educate and obligate the State force in the work. The inspection of the established inspection points should be done at the same time as the nursery inspection and by the same forces. It will, however, be some years before this work can be definitely and finally assigned to the State people. Much of it will need to be done by our men for some years.

Quarantine.

Quarantine 63 has not proved difficult of enforcement in the State and the force such as we had in the fall should be adequate. Something, however, should be done during the flowering season of *R. sanguineum* to prevent its free passage across the Columbia River. Quarantine here has been a joke in the past and as the disease intensifies in Washington the danger assumes greater proportions. It seems little short of nonsense to spend thousands of dollars in inspection of dormant nursery stock to see that it is dipped and other details seen to and allow fresh bushes to come in by the thousands from diseased territory at a season when uredines must be in excellent condition. There can be no doubt about, not the possibility, but probability of bouquets being picked in regions like Chico where infected leaves are bound to be numerous and brought directly into Portland or other parts of Oregon.

There is more danger there than in anything outside white pine shipments for artificial spread of the rust. The interstate bridge has never been watched except on Sundays and holidays and not adequately so on those days. The bridges and ferries should be properly posted by the Federal Horticultural Board. Signs with paintings of the red flowering currant and letters easily read at a hundred yards should be used. Places like Chico should also be glaringly posted.

Inspection for the Disease.

In connection with the inspection for the disease, outposts of the pines should be definitely located. The intense scouting should continue. It will be well to supplement the Oregon scouting with careful scouting in Western Washington. This can best be done in the fall when intensification on Ribes may indicate the proximity of pine infection.

Susceptibility of Ribes

At present we know practically nothing about the susceptibility of the Ribes of the sugar pine regions. It seems possible Ribes susceptibility may vary somewhat with environment. It, however, seems very probable that Ribes planted under conditions differing from their natural one will still show to a marked extent degrees of susceptibility governed by species rather than habitat. I can hardly conceive of R. bracteosum being being planted under conditions where it would become very resistant. After all probably the chief factor in determining susceptibility is species. If this be true we should at an early date establish a Ribes garden where the species common to the sugar pine region can be studied.

Ecological Work

Ecologically the Cascade Mountains can be divided for our purpose into three regions which differ greatly in Ribes species. Each of these in turn shows an eastern and western aspect. The Mt. Hood Region offers a great variety of Ribes, in places associated with white pine. There are all sorts of forest conditions from ancient to recent burns and young reproduction to mature timber.

If we have a control project in this region we could well carry on some ecological work -- keeping in mind the species of Ribes and the ability of each to survive under the different forest conditions.

In case we have no eradication project or it is located in some other section of Oregon I think we should study Ribes in burns in the Santiam region as this is more accessible and gives a great range of burns.

There is no vital need for haste in the ecological studies in Oregon. In fact a small amount each year has its advantages. Here we are not likely to be confronted with the rust in serious proportions for several years. The work can well be planned to cover the different regions of the Cascades and the Siskyous but not in a single year or even two years but probably in a five year period.

I figure that while our ecological studies are in a formative state much money and effort could be wasted by making it to extensive. Personally I would favor a two-man crew each season. After perhaps two seasons we may know more definitely what we are after and how we are going to get it.

Local Control Work.

Future generations may speak of the blister rust workers of today as having been visionary or they may accuse them of shortsightedness. Again they may speak of them as men of vision. To be a man of vision one must gamble on the future.

The tendency on the part of lumbermen is to advise control work on land where there are values in merchantable timber as it stands today. Little thought is given to reproduction unless definite values are in sight. Yet our work which will probably count for most in the future is going to be in young reproduction. In this we must gamble on the future forest management, on the possibility of insect depredations and on forest fires. I believe, however, that it is safe to say we are justified in advocating local control where standing reproduction warrants us in believing a white pine forest will stand in the future. It is extremely likely other factors than blister rust will enter into the proper management in the uture. As years pass fire will become less and less a problem but insects will have to be considered. We will certainly make a mistake if we conclude that white pine in such and such a region will never be worth protecting for beetle or fire will get it if blister rust doesn't.

The location of a site for control work is not easy. The route that blister rust will take in Oregon is conjectural. It seems likely, however, that the general course will be down the coast and up the Columbia. Conditions in the sugar pine regions do not seem to indicate that the sweep of the disease will be rapid. There are, however, too many factors in that region of which we know so little, such as the possible overwintering of the disease on such species as R. nevadense which in some localities retains leaves throughout the year, and another, the great variety of Ribes the susceptibility of which we know nothing. It is safe to predict that the advance of blister rust in the sugar pine will be relentless if not rapid. The north end of the Cascades of Oregon, however, offer a very different set of conditions. Western white pine reproduction is abundant on burned over lands and in close association with R. bracteosum in abundance. We may well have here a second Daisy Lake once blister rust reaches it. Wind, moisture and other factors are prime. In fact the stage is set for the big act. Personally I favor locating our project in the Mount Hood region.

Eradication Work

If we get a Blister Rust State Committee the location of a project should first be considered by this body.

I am on the fence to that extent that I feel my own mind might be changed about the desirability of locating the project in the Mt. Hood Region. It, however, presents a variety of conditions which seem to warrant consideration.

1. The sweep of the winds of the Columbia are likely to spread the rust to that section at an early date.

2. Conditions are favorable for a second Cheekye infection. That is, Ribes and pines are intimately associated in places where the spores swept by wind could do great damage.

3. There is abundant white pine reproduction in this region together with some commercial white pine timber.

4. The Forest Service has its most extensive Oregon white pine planting in this region.

5. There will be a strong sentiment for the protection of the white pines here because it is a scenic playground visited by thousands each year.

The Chico Plot.

The Oregon work is so intimately associated with that of Western Washington that the two regions can hardly be considered entirely independently of each other. I feel that we should set aside the Chico plot as a study plot. Accessibility, Ribes and pine associations and quantity of infection make this desirable.

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ANALYSIS OF OREGON ERADICATION AREA

by

W. V. Benedict - Junior Forest Pathologist

Purpose

The purpose of the rechecking of the Oregon Eradication Area was to obtain some information on the following:

(1) A recheck of the efficiency of eradication as determined by the 1925 check (based upon missed bushes).

(2) A check of the efficiency of eradication from the standpoint of regenerated bushes (improper eradication).

(3) To ascertain the number of new bushes occurring on the area (seedlings).

(4) To make a general analysis of Ribes conditions one year after eradication as an indication of future work necessary to protect an area.

Location of Area

The Oregon Eradication Area is in T 31 S, R 2 E, Willamette M and is near Woodruff Meadows Ranger Station. It is in general on a southeast facing slope between the Rogue River and the Umpqua divide. Four small streams with smaller branches constitute the drainage system. The average elevation is about 4000 feet but there are differences of more than 1000 feet between the highest and lowest points.

Work Performed

The entire eradication area, consisting of 1874 acres, was given a 2% check by the strip method. Strips one rod wide were run at 12 1/2 chain intervals across the area in such a direction as to encounter all eradication types. Each strip was permanently marked for future reference. Ribes encountered along these strips were classified according to:

(1) bushes missed by eradication crews,

(2) regenerated bushes improperly eradicated (crown sprouts and layering)

(3) new bushes established on the area since eradication.

The height of the bushes and amount of live stem of each were also recorded. These data were recorded separately by types on each strip. Type acreages were also taken on each strip.

Results

Table No. I This table shows the number of Ribes, by species, and the amount of live stem, in feet or fraction thereof, per acre occurring on each of the several types of the eradicated area according to the reason for their occurrence: whether as a result of the eradication crews failing to find the bushes, or failing to properly eradicate the bushes, or as the result of germination of seeds in the ground.

Table No. II This table shows the efficiency of eradication on each type by species, under three classifications:

(1) Efficiency of eradication from the standpoint of bushes not found by crewmen.

(2) Efficiency of eradication from the standpoint of improper eradication of bushes.

(3) Efficiency of eradication from the standpoint of new bushes occurring on the area since eradication.

The efficiency of the work as computed from checking data taken immediately after eradication in 1925 is also included to give a comparison to the efficiency as found in 1926.

Table No. III This table consists of the compiled data of the one-tenth acre special G.klamathensis plot eradicated in 1925. The number of Ribes occurring on this special plot were recorded under the various manners in which they were found to be recurring on the plot, and the efficiency of the eradication according to, (1) missed bushes, (2)new growth and (3) new plants, is computed.

Table No. I.

Number of Ribes and Feet of Live Stem Checked per Acre.

Type	No. Acres Checked	% of Check	R. sanguineum										R. lacustre									
			Missed Bushes	F.L.S	Crown Sprouts	F.L.S	Layering	F.L.S	Seedlings	F.L.S.	Total Ribes Checked	Total F.L.S	Missed Bushes	F.L.S.	Crown Sprouts	F.L.S	Layering	F.L.S.	Seedlings	F.L.S.	Total Ribes Checked	Total F.L.S
Creek	[illegible]	[illegible]	1.[illegible]	[illegible]	[illegible]	0.2	0.2	[illegible]			1.[illegible]	[illegible]	[illegible]	21.	1.3	0.7	1.[illegible]	[illegible]	2.[illegible]	[illegible]	[illegible]	27.7
Brushy Burn	0.22	0.7																				
Open Mature Timber	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.1					0.4	[illegible]										
Transitional	[illegible].05	1.4	0.2	10.2							0.2	10.[illegible]										
Brushy Mature Timber	3.68	[illegible].1	1.5	10.1	0.2	0.[illegible]			0.2	0.09	1.7	10.09										
Reproduction and Brush Patch	0	0																				
Pottol Mature Timber	5.45	1.9	0.9	2.5							0.9	2.5	0.[illegible]	1.[illegible]							0.[illegible]	1.3
Totals for All Types	37.66	2.0	7.0	67.0	0.7	0.[illegible]	0.2	0.02	0.[illegible]	0.09	8.1	67.61	7.2	22.[illegible]	1.3	[illegible].7	1.[illegible]	[illegible]	[illegible].7	[illegible]	12.9	2[illegible].0
Average Misses and F.L.S. per A.			1.2	11.[illegible]	0.12	0.0[illegible]	0.0[illegible]	[illegible]	0.0[illegible]	0.01[illegible]	[illegible]	11.27	1.2	[illegible].5	.21	[illegible]	[illegible]	0.[illegible]1	[illegible]	.08	[illegible]	[illegible]

Type	G. lobbii										R. visco.		G. bin					
	Missed Bushes	F.L.S	Crown Sprouts	F.L.S	Layering	F.L.S.	Seedlings	F.L.S	Total Ribes Checked	Total F.L.S	Missed Bushes	F.L.S	Crown Sprouts	F.L.S	Total Bushes Checked	Total F.L.S. Checked	New Growth	New Plants
Creek							0.2	0.02	0.2	0.02					14.5	69.04	3.6	2.9
Brushy Burn	[illegible]	12.0							3.0	12.0					[illegible]	12.0		
Open Mature Timber	0.1	0.7							0.1	0.7					[illegible]	[illegible]		
Transitional															0.2	10.2		
Brushy Mature Timber											0.57	4.1			2.27	1[illegible]	.2	.2
Reproduction and Brush Patch																		
Pottol Mature Timber													0.2	0.2	1.6	4.5	.2	
Totals for All Types	[illegible].1	12.7					0.2	0.02	[illegible].3	12.72	0.57	4.1	[illegible].2	0.2	[illegible]0.07	115.65	.67	.1
Average Misses and F.L.S. per A.	1.05	[illegible].11					0.03	0.003	1.36	[illegible].11	0.0[illegible]	0.7	0.05	0.05	5.01	18.93		

EFFICIENCY of ERADICATION

*Figures above line indicate plants older than seedlings. Figures below line indicate seedlings. (Two-figure cells are given as "above / below".)

Number of Bushes Pulled Per Acre

Block Number	Type	Acreage of Type	% of Type Checked	Difficulty of Working	All Bushes: * G. roezli	All Bushes: * R. nevadense	All Bushes: R. cereum	All Bushes: Total	Bushes Over 6": G. roezli	Bushes Over 6": R. nevadense	Bushes Over 6": R. cereum	Bushes Over 6": Total	Bushes Over 12": G. roezli	Bushes Over 12": R. nevadense	Bushes Over 12": R. cereum	Bushes Over 12": Total
1	Stream Cut-Over	62	5.2	11.6	451.01	57.73		508.74	177.75	57.73		235.48	139.15	43.29		182.44
2	N. Exp. Cut-Over	144	2.08	24.0	67.59 / 80.94	2.15	0.003	150.7	27.03	2.1	0.003	29.14	25.0	1.6	0.003	26.6
3	S. Exp. Cut-Over	66	3.0	15.25	37.4 / 4.3	1.3		43.0	29.9	1		30.9	18.6	0.9		19.5
4	Stream Cut-Over	25	4.0	11.50	296.7 / 176.8	17.4	0.08	491	165.4	17.4	0.08	160.9	138.3	13.0	0.08	151.4
5	S. Exp. Cut-Over	110	4.3	14.75	32.0	0.6		32.6	18.22	0.6		18.82	15.36	0.45		15.81
6	S. Exp. Cut-Over	134	4.6	15.0	2.0			2.0	2.0			2.0	1.45			1.45
7	S. Exp. Cut-Over	36	4.16	21.25	97.61 / 73.61	0.2	0.06	171.5	88.9	0.2	0.06	89.16	77.6	0.1	0.06	77.76
8	N. Exp. Mature	146	2.7	19.25	25.6 / 0.4	0.003	0.001	26.0	21.5	0.002	0.001	21.5	12.8			12.8
9	S. Exp. Mature	95	6.3	9.25	0.99	0.01		1.0	0.95	0.01		0.96	0.90	0.01		0.91
10	Stream Mature	20	12.5	19.25	83.70 / 18.60	10.4 / 5.5		118.2	77.4	10.4		87.8	41.25	7.94		49.19
** 11-A	S. Exp. Mature	45	6.2	13.0	15.2 / 5.4	0.8		21.4	13.8	0.7		14.5	11.4	0.4		11.8
** 11-B	S. Exp. Mature	45	6.0	9.75	16.0 / 1.0	1.9	0.02	18.9	15.7	1.7	0.02	17.4	14.1	1.4	0.02	15.2
** 11-C	S. Exp. Mature	45	5.5	9.50	9.7 / 0.4	0.9		11.0	9.3	0.8		10.1	7.0	0.6		7.6
12	Stream Mature	21	10.7	20.25	47.5 / 22.6	36.5 / 25.6		132.2	37.2	29.2		66.4	23.9	25.5		49.4
13	Stream Mature	45	3.3	13.0	61.9 / 18.0	37.1 / 37.0		154.0	53.8	29.7		83.5	34.0	24.5		58.5
14	N. Exp. Mature	100	2.0	21.0	19.67 / 3.7	15.61 / 4.58		43.76	13.55	1.13		24.87	8.97	8.49		17.46
15	S. Exp. Mature	100	3.0	12.0	2.3 / 0.05	0.02		2.37	2.2	0.02		2.22	1.8	0.01		1.81
16	N. Exp. Mature	130	3.07	31.0	21.8 / 1.7	22.2 / 6.3		52.0	18.3	17.4		35.7	10.9	12.4		33.3
17	Stream Mature	30	4.0	27.0	43.4 / 4.1	66.1 / 65.1		178.7	34.7	56.2		90.9	21.7	49.6		71.3
18	Thicket	125	0	38.0	0.5	0.02		0.52	0.5	0.02		0.52	0.5	0.02		0.52
19	S. Exp. Mature	120	3.3	3.25	2.3			2.3	2.3			2.3	2.0			2.0
20	Stream Mature	50	3.5	10.5	53.1 / 9.7	17.9 / 8.9		94.6	50.5	14.3		64.8	31.9	11.8		43.7
21	Stream Mature	15	6.6	11.0	69.2 / 10.5	114.3 / 74.6		268.6	60.2	104.8		165.0	34.6	75.4		110.0
22	N. Exp. Mature	168	3.1	11.25	51.9 / 0.4	1.4 / 1.6		55.3	41.5	0.7		42.2	24.9	0.1		25.0
23	N. Exp. Mature	75	2.6	22.75	56.3 / 1.9	8.1	R.h. 0.9	67.2	45.7	6.4	R.h. 0.9	53.0	27.2	5.3	R.h. 0.6	33.1
24	N. Exp. Brush	175	2.7	28.00	117	4.8	0.4	122.2	93.6	4.2	0.4	98.2	64.3	2.6	0.4	67.3
25	Stream Mature	45	4.4	13.00	28.6 / 2.8	36.8 / 35.4	0.4	104.0	25.0	29.4	0.4	54.8	15.7	24.3	0.2	40.2
26	N. Exp. Mature	292	2.7	13.25	29.4	0.9		30.3	23.2	0.5		23.7	14.5	0.3		14.8
27	Stream Mature	40	5.0	8.50	27.7 / 0.4	3.4 / 0.8		32.3	19.8	2.4		22.2	13.6	1.9		15.5
**28	N. Exp. Mature	65	3.0	9.50	24.9	2.5		27.4	20.0	2.0		22.0	14.8	1.5		16.3
29	S. Exp. Mature	55	7.8	7.50	43.7 / 0.2		0.9	43.9	37.1		0.09	37.2	26.2		0.07	26.27
30	Stream Mature	35	4.0	1.25	21.7	1.2		22.9	20.8	1.1		21.9	18.2	0.8		19.0
31	S. Exp. Mature	135	3.0	12.00	17.1	2.1		19.2	14.5	1.7		16.2	12.8	1.2		14.0
32	Flat Mature	225	3.1	7.25	3.8	0.2		4.0	3.3	0.1		3.4	1.9	0.05		1.95
33	S. Exp. Mature	60	3.0	9.00	0.14			0.14	0.14			0.14	0.14			0.14
34	N. Exp. Mature	55	2.0	19.50	35.4	0.1	0.04	35.6	28.4	0.1	0.04	28.5	17.9	0.1	0.04	18.0
Weighted averages			3.04	15.03	48.9	9.3	0.2	58.4	28.3	5.4	0.1	33.8	19.8	4.3	0.1	24.2
		1	100	8.50	122 / 4	25 / 5		166	107	18		125	73	14		87
#	N. Exp. Mature	29.4	4.8	12.25	55.4 / 1.8	4.8 / 7.7		69.7	44.3	3.1		47.4	27.6	1.2		28.8
##	N. Exp. Mature	34.0	4.8	17.00	25.0	0.2		25.2	20.0	0.2		20.2	13.5	0		13.5
###	N. Exp. Mature	45.0	3.1	9.00	40.7 / 0.7	1.4 / 1.1		43.9	33.6	0.7		34.3	20.3	0.3		20.6

Number of Bushes Missed per Acre

Block Number	All Bushes: G. roezli	All Bushes: R. nevadense	All Bushes: R. cereum	All Bushes: Total	Bushes Over 6": G. roezli	Bushes Over 6": R. nevadense	Bushes Over 6": R. cereum	Bushes Over 6": Total	Bushes Over 12": G. roezli	Bushes Over 12": R. nevadense	Bushes Over 12": R. cereum	Bushes Over 12": Total
1	93.5	1.5		94.5	38	1		39	21	0.5		21.5
2	17.3	0.33	0	17.63	8.6	0.33	0	8.93	4.0	0.33	0	4.33
3	9.5			9.5	7.0			7.0	4.0			4.0
4	75.0	3.0		78.0	7.0	1.0		8.0	1.0	1.0		2.0
5	6.31	0		6.31	2.94	0		2.94	0.84	0		0.84
6	0.5			0.5	0.5			0.5	0.33			0.33
7	14.0			14.0	4.0			4.0	2.0			2.0
8	1.0			1.0	0.7			0.7	0			0
9	0	0		0	0	0		0	0	0		0
10	4.4	0.4		4.8	2.4	0.4		2.8	0.8	0.4		1.2
** 11-A	1.07	0		1.07	0.7	0		0.7	0.7	0		0.7
** 11-B	1.11	0	0	1.11	0.74	0	0	0.74	0	0	0	0
** 11-C	0.8			0.8	0.8			0.8	0	0		0
12	12.1	4.1		16.2	3.2	1.3		4.5	0.4	0		0.4
13	5.3	0		5.3	2.0	0		2.0	1.4	0		1.4
14	2.0	1.0		3.0	2.0	0		2.0	1.5	0		1.5
15	0.33	0		0.33	0.33	0		0.33	0	0		0
16	5.75	1.5		7.25	4.2	0.75		4.95	1.5			1.5
17	1.6	11.6		13.2	0.8	3.3		4.1	0	0		0
18				N	e	t		C	h	e	c	k
19	0.75			0.75	0.75			0.75	0.25			0.25
20	5.2	3.4		8.6	1.7	1.1		2.8	0	0		0
21	1.0	9.0		10.0	[illegible]	[illegible]		3.0	0	0		0
22	1.3	0.2		1.5	1.3	0		1.3	0.5	0		0.5
23	2.5	1.0	R.h. 0	3.5	2.5	1.0	R.h. 0	3.5	0	0.5	R.h. 0	0.5
24	13.1	0.6	0	13.7	11.4	0.6	0	12.0	5.7	0.6	0	6.3
25	2.5	3.5	0	6.0	1.0	0.5		1.5	0	0		0
26	0.6	0.4		1.0	0.5	0.4		0.9	0.3	0.1		0.4
27	6.0	1.0		7.0	1.0	0		1.0	0	0		0
**28	5.5	1.0		6.5	4.5	0.5		5.0	2.5	0		2.5
29	3.7		0.2	3.9	2.5		0.2	2.7	0.9		0	0.9
30	2.9	1.5		4.4	2.9	1.5		4.4	1.5	0		1.5
31	2.0	0.6		2.6	2.0	0		2.0	1.0	0		1.0
32	1.1	0.1		1.2	1.1	0.1		1.2	0.6	0		0.6
33	0			0	0	0		0	0			0
34	4.0	0		4.0	3.0	0		3.0	1.0	0		1.0
Weighted averages	5.9	0.7		6.6	2.5	0.3		2.8	1.0	.06		1.06
	13	5		18	0	0		0	0	0		0
#	0	0		0	0	0		0	0	0		0
##	4.0	0		4.0	4.0	0		4.0	4.0	0		4.0
###	4.0	0		4.0	4.0	0		4.0	4.0	0		4.0

Feet of Live Stem Pulled and Missed Per Acre

Block Number	Pulled: G. roezli	Pulled: R. nevadense	Pulled: R. cereum	Pulled: Total	Missed: G. roezli	Missed: R. nevadense	Missed: R. cereum	Missed: Total
1	2083.7	794.5		2878.2	44.1	1.15		45.25
2	817.84	55.75	1.2	873.59	68.2	4.3	0	72.5
3	710.0	11.7		721.7	62.6			62.6
4	2967.6	52.2	7.2	3027.0	26.7	5.4		32.1
5	524.73	8.3		533.03	14.35	0		14.35
6	32.7			32.7	1.57			1.57
7	2049.8	2.0	2.4	2054.2	36.26			36.26
8	197.0			197.0	1.7			1.7
9	32.6	0.1		32.7	0	0		0
10	418.4	62.4		480.8	4.6	0.8		5.4
** 11-A	157.9	7.4		165.3	7.1			7.1
** 11-B	175.5	17.4	0.4	193.3	1.0	0	0	1.0
** 11-C	107.0	7.4		114.4	1.4	0		1.4
12	475.2	729.5		1204.7	12.0	3.0		15.0
13	619.1	687.3		1306.4	6.3	0		6.3
14	167.02	202.28		369.3	19.8	0		19.8
15	296.4	0.24		296.6	0.4	0		0.4
16	168.1	178.2		346.3	22.1	1.8		23.9
17	450.6	1124.2		1574.8	1.6	6.2		7.8
18	e	d				N		o
19	34.7			34.7	2.9			2.9
20	380.8	250.6		631.4	5.1	1.4		6.5
21	692.0	1038.0		1730.0	0.8	2.5		3.3
22	332.0	1.4		333.4	14.6	0.3		14.9
23	419.3	80.4	R.h. 3.9	503.6	9.2	1.1	R.h. 0	10.3
24	1404.0	46.7	44.0	1494.7	67.8	18.1	0	85.9
25	286.4	688.1	3.3	977.8	0.9	1.3		2.2
26	186.1	3.3		189.4	1.7	0.8		2.5
27	477.1	31.7		508.2	3.5	1.1		4.6
**28	231.5	30.3		261.8	32.4	0.6		33.0
29	524.3		0.5	524.8	7.8		0.2	8.0
30	349.4	13.8		363.2	7.6	1.7		9.3
31	171.5	22.9		194.4	20.9	0.5		21.4
32	50.7	0.1		50.8	8.4	0.4		8.8
33	2.3			2.3	0			0
34	354.7	1.6	0.5	356.8	17.5	0		17.6
Weighted averages	389.8	82.5	3.8	476.1	13.5	1.4		14.9
	2597.7	226.7		2824.4	5.6	2.1		7.7
#	386.1	4.6		390.7	0	0		0
##	175.0	0		175.0	120.0	0		120.0
###	284.5	1.2		285.7	6.0	0		6.0

Percent of Efficiency of Eradication by Number of Bushes / by Feet of Live Stem

Block Number	No. All Bushes: G. roezli	No. All Bushes: R. nevadense	No. All Bushes: R. cereum	No. All Bushes: Average	No. Over 6": G. roezli	No. Over 6": R. nevadense	No. Over 6": R. cereum	No. Over 6": Average	No. Over 12": G. roezli	No. Over 12": R. nevadense	No. Over 12": R. cereum	No. Over 12": Average	Feet of Live Stem: G. roezli	Feet of Live Stem: R. nevadense	Feet of Live Stem: R. cereum	Feet of Live Stem: Average
1	79.27	97.45		81.43	82.39	98.31		83.48	86.89	99.89		89.46	97.89	99.56		98.44
2	89.57	86.31	100	89.54	75.85	86.31	100	76.55	86.94	82.64	100	86.10	92.33	92.8	100	92.34
3	81.45	100		81.71	81.09	100		81.37	82.31	100		83.00	91.90	100		92.02
4	86.60	85.30	100	86.30	90.06	94.57	100	95.77	99.28	92.86	100	98.70	99.11	90.28	100	98.96
5	83.51	100		83.78	86.11	100		86.49	94.82	100		95.73	97.34	100		97.38
6	80.00			80.00	80.00			80.00	81.56			81.56	95.42			95.42
7	92.44	100	100	92.45	95.70	100	100	95.71	97.49	100	100	97.50	98.28	100	100	98.29
8	96.30	100	100	96.30	96.85	100	100	96.85	100	100	100	100	99.14	100		99.14
9	100	100		100	100	100		100	100	100		100	100	100		100
10	95.88	97.55		96.10	97.00	96.30		96.81	98.10	95.21		97.43	98.92	98.71		98.89
** 11-A	95.07	100		95.07	95.78	100		95.78	94.22	100		94.22	95.76	100		95.96
** 11-B	94.45	100	100	95.00	95.52	100	100	95.92	100	100	100	100	99.44	100	100	99.49
** 11-C	92.73	100		93.22	92.00	100		92.73	100	100		100	98.71	100		98.80
12	65.37	93.94		89.20	92.50	96.67		93.64	98.34	100		99.20	97.56	99.60		98.77
13	93.77	100		96.67	96.42	100		97.67	96.05	100		97.67	99.04	100		99.53
14	92.16	95.24		93.31	87.05	100		92.54	85.72	100		94.24	89.99	100		94.86
15	88.46	100		88.47	88.46	100		88.46	100	100		100	99.87	100		99.87
16	80.31	95.00		87.76	81.34	95.86		87.81	87.91	100		95.69	88.39	99.00		93.50
17	96.69	91.88		93.13	97.75	94.46		95.79	100	100		100	99.65	99.46		99.51
18		t		C	h		e		c			k	e		d	
19	75.00			75.00	75.00			75.00	90.00			90.00	92.30			92.30
20	92.88	88.75		91.67	96.75	92.86		95.86	100	100		100	98.68	99.45		98.99
21	98.77	95.46		96.42	98.37	98.14		98.22	100	100		100	99.99	99.99		99.99
22	97.58	93.75		97.58	96.97	100		96.97	98.04	100		98.04	95.79	82.36		95.76
23	95.89	88.89	R.h. 100	94.98	94.82	86.49	R.h. 100	93.81	100	91.38	R.h. 100	98.52	97.85	98.66	R.h. 100	98.00
24	89.93	89.66	100	89.93	89.15	87.55	100	89.15	91.99	81.25	100	91.99	95.40	72.07	100	94.57
25	92.63	95.38	100	94.55	96.16	98.33	100	97.34	100	100	100	100	99.69	99.82	100	99.78
26	98.00	69.23		96.81	97.89	55.56		96.33	97.98	75.00		97.37	99.10	80.49		98.70
27	82.41	80.77		81.24	95.20	100		95.69	100	100		100	99.27	96.65		99.12
**28	81.91	71.43		80.53	81.64	80.00		81.53	85.55	100		85.71	87.73	98.06		88.81
29	92.23			92.23	91.56			91.56	96.68			96.68	98.54		71.43	98.54
30	88.22	44.45		83.89	87.77	42.31		83.27	92.39	100		93.59	97.88	89.04		97.51
31	89.53	77.78		88.08	87.88	73.92		86.71	92.76	100		93.34	89.14	97.87		90.09
32	77.55	66.67		76.93	75.00	50.00		66.67	76.00	100		76.00	85.79	20.00		85.24
33	100			100	100			100	100			100	100			100
34	89.85	100	100	89.86	90.45	100	100	90.46	94.71	100	100	94.72	95.30	100	100	95.31
Weighted averages	89.24	93.00		89.87	91.89	94.74		92.35	95.20	98.63		95.81	96.66	98.33		96.97
	90.65	85.72		89.66	100	100		100	100	100		100	99.79	99.09		99.77
#	100	100		100	100	100		100	100	100		100	100	100		100
##	86.21	100		86.21	83.34	100		83.34	77.15	100		77.15	59.33	100		59.33
###	91.19	100		91.65	89.37	100		89.40	100	100		100	97.97	100		97.97

** Experimental plots, mixed type.
*** This block eradicated by special scout crew of 4 men without checker. A wide interval and fast pace was maintained.
# Sample plot stream mature and north exposure mature type.
String experiment string lanes set in ahead of eradication.
String laid in by crew as they worked.
Regular paper trail.

Table No. III.

G. klamathensis Special Plot.

Type	No. of Ribes Originally on Plot	Number of Ribes Checked on one-tenth Acre Plot.												Efficiency of Eradication			
		Sprouting from Crown		Sprouting from Roots		Pulled Bushes* Rejuvenating		Seedlings		Missed Bushes		Total Bushes Checked	Total F.L.S. Checked	Missed Bushes	New Growth	New Plants	Average
		Bushes	F.L.S.	Bushes	F.L.S.	Bushes	F.L.S.	Bushes	F.L.S.	Bushes	F.L.S.						
Brushy Swamp Near A Stream	540 G. klam.	32	42.0	6	16.5	9	18.8	49	4.9	10	87.0	106	169.2	98.11%	92.00%	91.68%	83.60%
Percentage of Total Missed.		30.19%	24.83%	5.67%	9.75%	8.49%	11.11%	46.22%	2.89%	9.43	51.42%	100	100				

* Pulled bushes left on the ground forming a new root system.

Significance of Results

An examination of Table No. 1 discloses there to remain, on an average acre of the eradicated area, 5.01 Ribes bushes containing 18.93 feet of live stem. These bushes are largely concentrated along the streams, the average acre of stream type containing 14.5 Ribes bushes with 69.64 feet of live stem. The majority of bushes found on the area were the result of "misses" by eradication men, there being some regenerated bushes and seedlings occurring, especially along the streams.

While no definite figures are available in the West at this time on the number of Ribes and amount of live stem it is permissible to leave on an area and have the area protected, comparisons with eastern figures clearly indicate that the Oregon area is at the present time sufficiently protected to prevent loss to the white and sugar pine from blister rust. The heavier concentrations found along the streams would undoubtedly necessitate re-eradication within several years.

It will be noticed in Table No. II that the average efficiency of eradication as checked in 1926 is 4.3% higher than that shown in 1925, and that the efficiency of the job, including the regenerated bushes and new plants is 1.91% higher than that shown in 1925. While no two checks of the same area would yield the same percentages the 1926 figures would be expected to be lower than the 1925 figures due to the new bushes and regenerated bushes. The fact that the 1926 check was made late in the season when defoliation had been under way and during rainy weather undoubtedly resulted in some of the plants being missed by the checking men. It is apparent, however, that there is still insufficient new growth on the area to require a new eradication. Future observations may disclose the necessity for re-eradication.

Plot Study

An examination of the one-tenth acre *G. klamathensis* special plot disclosed some rather astonishing figures, which indicate the reverse of the main eradicated area. This plot originally contained 540 *G. klamathensis* bushes having over 20,000 feet of live stem. The area was eradicated by close crew formation. A check of this plot in the fall of 1926 disclosed 106 bushes with 169.2 feet of live stem. Not only were missed bushes numbered among those checked but crown sprouting, root sprouting, stem layering and seedlings were showing up on the area.

The recurrence of Ribes at this rate on an area of such a type is proof enough that re-eradication is necessary before protection can be hoped for. It is on such areas that chemical eradication will successfully substitute hand pulling in the elimination of Ribes.

BLISTER RUST CONTROL WORK IN CALIFORNIA
1926

Blister rust control work in California during 1926 has consisted of the following projects: cultivated black currant eradication, experimental Ribes eradication, control reconnaissance on Federal lands, educational work and scouting for the disease. This work was directed by Mr. G. A. Root, Assistant Pathologist and State Leader for California. Under the terms of the cooperative agreement given below, Mr. Root is headquartered at Sacramento, California, occupying office space in the State Department of Agriculture. On this work Mr. Root has been assisted by Mr. P. E. Melis, Junior Forester, Mr. W. V. Benedict, Junior Forester and Mr. E. C. Kenyon, Agent. These men have been headquartered at the School of Forestry, University of California, Berkeley, California. The following is the memorandum of understanding under the terms of which this work has been organized:

MEMORANDUM OF UNDERSTANDING BETWEEN THE CALIFORNIA DEPARTMENT OF AGRICULTURE, THE CALIFORNIA STATE BOARD OF FORESTRY, THE DIVISION OF FORESTRY, UNIVERSITY OF CALIFORNIA, AND THE BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE, RELATIVE TO COOPERATIVE WHITE PINE BLISTER RUST CONTROL WORK IN CALIFORNIA.

EFFECTIVE JULY 1, 1926 to JUNE 30, 1927.

For the purpose of effectively controlling the white pine blister rust in California, the several cooperating agencies shall cooperate in a joint program as indicated below.

1. The Bureau of Plant Industry shall employ and direct the work of one or more men who shall assist in prosecuting the following cooperative activities; eliminating the cultivated black currant (Ribes nigrum) from the State by systematically locating and securing the destruction of these plants; inspecting plant shipments, in cooperation with the Federal Horticultural Board, at strategic terminal and transfer points to detect and prevent violations of State and Federal blister rust quarantines; scouting to determine the presence of the disease in the State; performing control reconnaissance; conducting experiments and demonstrations in local control methods. The Bureau of Plant Industry is responsible for the proficiency of its employees assigned to duties under the terms of this agreement, and in addition agrees to provide the necessary technical information regarding the disease to such employees of the other cooperating agencies that are assigned to work contemplated in this agreement.

2. The California Department of Agriculture shall pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violations of State and Federal blister rust quarantines; shall use its regular employees, so far as their other duties permit, and shall direct the work of its cooperating horticultural officials, so far as their other duties permit, in systematically locating and destroying cultivated black currants and infected blister rust host plants, in scouting for white pine blister rust, and in inspecting nurseries for this disease. It is recognized that at this time the California Department of Agriculture has no special appropriation for blister rust control, and that therefore such blister rust control work as is performed by the employees of the California Department of Agriculture and its cooperating horticultural officials under the terms of this agreement will be done in connection with their other duties.

3. The California State Board of Forestry shall use its regular employees, so far as their other duties permit, in systematically locating cultivated black currants, in scouting for white pine blister rust, and in assisting in the compilation of information concerning location, ownership and volume of sugar pine stands to serve as a basis for local control and control reconnaissance.

4. The Division of Forestry, University of California, shall provide office, library and laboratory facilities for employees of the Bureau of Plant Industry who are permanently stationed in California upon local control or control reconnaissance work; and shall assist such men in their work by technical advice and the use of such technical records as they may have.

5. All official records and reports of work performed under this agreement shall be open to inspection by any or all parties to the agreement. All findings of blister rust made by any party to this agreement shall be promptly reported to all other parties to the agreement. All specimens collected by any party to this agreement which are suspected to be infected with blister rust shall be submitted to the Bureau of Plant Industry for final determination.

6. It is provided that from July 1, 1926 to June 30, 1927, inclusive, the California Department of Agriculture and its cooperators shall expend about $8,000.00, the State Board of Forestry about $5,000.00, the Division of Forestry, University of California, about $2,500., and the Bureau of Plant Industry about $15,000, in connection with the work specified. All expenditures made by the Bureau of Plant Industry shall be made in accordance with the fiscal regulations of the United States Department of Agriculture.

7. This memorandum of understanding shall take effect July 1,

2. The California Department of Agriculture shall pay the salaries and expenses and direct the work of one or more men who shall, during the proper season, inspect plant shipments for violations of State and Federal blister rust quarantines; shall use its regular employees, so far as their other duties permit, and shall direct the work of its cooperating horticultural officials, so far as their other duties permit, in systematically locating and destroying cultivated black currants and infected blister rust host plants, in scouting for white pine blister rust, and in inspecting nurseries for this disease. It is recognized that at this time the California Department of Agriculture has no special appropriation for blister rust control, and that therefore such blister rust control work as is performed by the employees of the California Department of Agriculture and its cooperating horticultural officials under the terms of this agreement will be done in connection with their other duties.

3. The California State Board of Forestry shall use its [illegible] employees, so far as their other duties permit, in systematically [illegible] cultivated black currants, in scouting for white pine blister rust, and in assisting in the compilation of information concerning location, ownership and volume of sugar pine stands to serve as a basis for local control and control reconnaissance.

4. The Division of Forestry, University of California, shall provide office, library and laboratory facilities for employees of the Bureau of Plant Industry who are permanently stationed in California upon local control or control reconnaissance work; and shall [illegible]sist such men in their work by technical advice and the use of such technical records as they may have.

5. All official records and reports of work performed under this agreement shall be open to inspection by any or all parti[illegible] agreement. All findings of blister rust made by any [illegible] ment shall be promptly reported to all other parties [illegible]. All specimens collected by any party to this agreement which are suspected to be infected with blister rust shall be submitted to the Bureau of Plant Industry for final determination.

6. It is provided that from July 1, 1926 to June 30, 1927, inclusive, the California Department of Agriculture and its cooperators shall expend about $3,000.00 , the State Board of Forestry about $5,000.00, the Division of Forestry, University of California, about $2,500., and the Bureau of Plant Industry about $15,000, in connection with the work specified. All expenditures made by the Bureau of Plant Industry shall be made in accordance with the fiscal regulations of the United States Department of Agriculture.

7. This memorandum of understanding shall tak effect July 1,

1926 and continue in force until June 30, 1927, or until previously terminated by mutual consent of the parties to this agreement.

Date	Signatures
Oct. 27, 1926	(s.) G. H. Hecke California Department of Agriculture.
Nov. 4, 1926	(s.) M. B. Pratt State Board of Forestry.
Oct. 23, '26	(s.) A. W. Sampson Division of Forestry, University of California.
Nov. 23, 1926	(s.) Wm. A. Taylor Bureau of Plant Industry, U. S. Department of Agriculture.

BLISTER RUST CONTROL WORK IN CALIFORNIA
1926.

By
George A. Root,
Assistant Pathologist.

Two other projects besides the black currant eradication were started in California during the past year, the experimental eradication of wild Ribes known as local control, and the attending control reconnaissance and ecological studies. That the reader may more easily discern the activities, the work is tabulated as follows:

I. State and Federal Cooperation.
II. Black Currant Eradication.
III. Quarantine Inspection.
IV. Nursery Inspection.
V. Educational Work.
  1. Panel exhibits.
  2. Blister rust films.
  3. Fair exhibits.
  4. Posters and bulletins.
  5. Newspapers.
  6. Talks.
VI. Scouting for the Disease.
VII. Recommendations.

The reports by Mr. Melis, Mr. Benedict, and Mr. Kenyon follow the report of the State Leader.

I. State and Federal Cooperation

Parties to the agreement drawn up with the U. S. Department of Agriculture are the State Department of Agriculture, the State Board of Forestry and the Division of Forestry - University of California. The amount expended by the Federal government will approximate $15,000. A like amount was expended by the cooperators, computed by the work done and represented in dollars and cents. This was not an actual cash expenditure, as no special appropriations for blister rust have been made by the state.

The annual convention of the State Forest Rangers and Fire Wardens was held in Sacramento, May 4 and 5. This offered a good opportunity to give a talk on blister rust and keep up the general interest on the subject. The men in this organization have given valuable assistance, regarding roads and locations of ranches in connection with the black currant work. A meeting of the State Board of Forestry, with representatives of lumber and forest conservation interests present, was held in San Francisco, March 22 and 23. Although the greater part of the program was given over to forest fire protection and financial matters, considerable time was given to the discussion of the black

currant bill which failed to receive the signature of the state executive in 1925. The consensus of opinion was that it should be reintroduced at the next session of the legislature in 1927.

The annual meeting of California Association of Horticultural Commissioners was held in San Diego, May 7 and 8. There is always a place on the program for a few remarks on blister rust. It is upon the members of this organization of the State Department of Agriculture that the greater part of the blister rust work devolves as designated in the cooperative agreement. These men in many cases have been responsible for the location of black currant plantings. Some have aided greatly in securing the removal of certain plantings where the Federal scouts had failed to get consent of the owners. Some have taken an active part in the educational phase of the work. With the thousand and one things with which these men have to contend, we feel that we have received a commensurate part of their time.

The Forestry Division of the University of California, even before its formal entry into the written agreement, gave valuable aid. It had furnished office space and given wise counsel to members of the blister rust office. Since its entry it has offered its facilities to Mr. H. R. Offord, in charge of chemical eradication of Ribes. These have been in the way of office, laboratory and greenhouse space as well as plots of ground for outdoor experiments.

The Office of Extension through its farm advisors has been of considerable help from the educational side of the work.

The cooperation and help of the U. S. Forest Service is taken for granted, naturally as blister rust is a problem of forestry. The forest rangers and other employees have as in the past given great assistance. Special mention should be made of the great help extended to us in the local control project by Mr. J. R. Hall, Supervisor of the Stanislaus National Forest and by members of his personnel.

II. Black Currant Eradication

This project has been carried on as in the past two years. An average of three men and two autos were employed for three months, the work starting July 1. There was no deviation from the general procedure. The consent of the owners was still necessary for the removal of the bushes.

The following counties were completed in 1926:

Table No. I.

Counties	No. of Plantings	No. of Bushes
Colusa	1	6
Yuba	1	1
Sutter	1	1
Yolo	1	2
Solano	8	18
Napa	4	16
El Dorado	11	82
Amador	2	5
Alpine	10	92
Calaveras	2	2
Tuolumne	2	14
Mono	0	0
Mariposa	0	0
Total	43	239

It is interesting to note that there were no "hold outs" this year. There is a considerable decrease in the number of plantings and bushes found as compared with the 1924 and 1925 seasons when 273 plantings and 1749 bushes and 242 plantings and 1464 bushes were found respectively. This makes a grand total of 558 plantings comprising 3452 bushes found thus far, exclusive of the nurseries.

The comparatively small number found in 1926 can be accounted for by the type of country scouted. Much of it comprised the wide Sacramento Valley where the lack of water and intense heat of summer are not conducive to the growth of small bush fruits. Some of the mountainous section was extremely dry which seemed to be the determining factor of currant growth or rather the lack of it. Where cultivated currants of the black fruited variety did occur they were of the American variety or Crandall's Black, R. aureum.

The following counties are proposed for eradication in 1927, Marin, Contra Costa, Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Inyo. With the completion of these counties, the area comprising the range of commercial sugar pine will all but be completed.

As has been stated in the Oregon report for 1925 "that it would be folly to claim that all black currants have been removed from Oregon," the same is true with reference to that territory covered thus far in California. It is the belief of the writer however that comparatively few bushes remain. After several season's work, a trained man can size up a section and its people and predict with considerable accuracy whether black currants will be found. It has been the endeavor of the Sacramento office to do as accurate work as possible with the time and money expended commensurate with the type and importance of the area covered from the standpoint of black currants.

Table No. 1.

Counties	No. of Plantings	No. of Bushes
Colusa	1	5
[illegible]	1	1
Sutter	1	1
Yolo	1	2
Solano	8	18
Napa	4	16
El Dorado	11	[illegible]
Amador	2	[illegible]
Alpine	1	[illegible]
Calaveras	[illegible]	2
[illegible]	2	14
Mono	0	[illegible]
Mariposa	0	0
Total	43	[illegible]

It is interesting to note that there were no "hold outs" this year. There is a considerable decrease in the number of plantings and bushes found as compared with the 1924 and 1925 seasons when 273 plantings and 1749 bushes and 242 plantings and 1464 bushes were found respectively. This makes a grand total of 558 plantings comprising 3452 bushes found thus far, exclusive of the nurseries.

The comparatively small number found in 1926 can be accounted for by the type of country scouted. Much of it comprised the wide Sacramento Valley where the lack of water and intense heat of summer are not conducive to the growth of small bush fruits. Some of the mountainous section was extremely dry which seemed to be the determining factor of currant growth or rather the lack of it. Where cultivated currants of the black fruited variety did occur they were of the American variety or Crandall's Black, R. aureum.

The following counties are proposed for eradication in 1927, Marin, Contra Costa, Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Inyo. With the completion of these counties, the area comprising the range of commercial sugar pine will all but be completed.

As has been stated in the Oregon report for 1926 "that it would be folly to claim that all black currants have been removed from Oregon," the same is true with reference to that territory covered thus far in California. It is the belief of the writer however that comparatively few bushes remain. After several season's work, a trained man can size up a section and its people and predict with considerable accuracy whether black currants will be found. It has been the endeavor of the Sacramento office to do as accurate work as possible with the time and money expended commensurate with the type and importance of the area covered from the standpoint of black currants.

There will always be a necessity for a Federal man to at least supervise the black currant work. It cannot be turned over entirely to our cooperative state agencies. The following map shows the present status of cultivated black currant eradication in California.

III. Quarantine Inspection

There is little to say on this topic with reference to the California situation. The quarantine work is handled thoroughly and efficiently by the state authorities. There seems to be no need for a Federal man at any point in this state. It may be interesting to note that between July 1, 1920 to November 15, 1926, 95 violations were found by the state men. One of these was foreign, two in violation of former regulation #54 and ninety-two of #26.

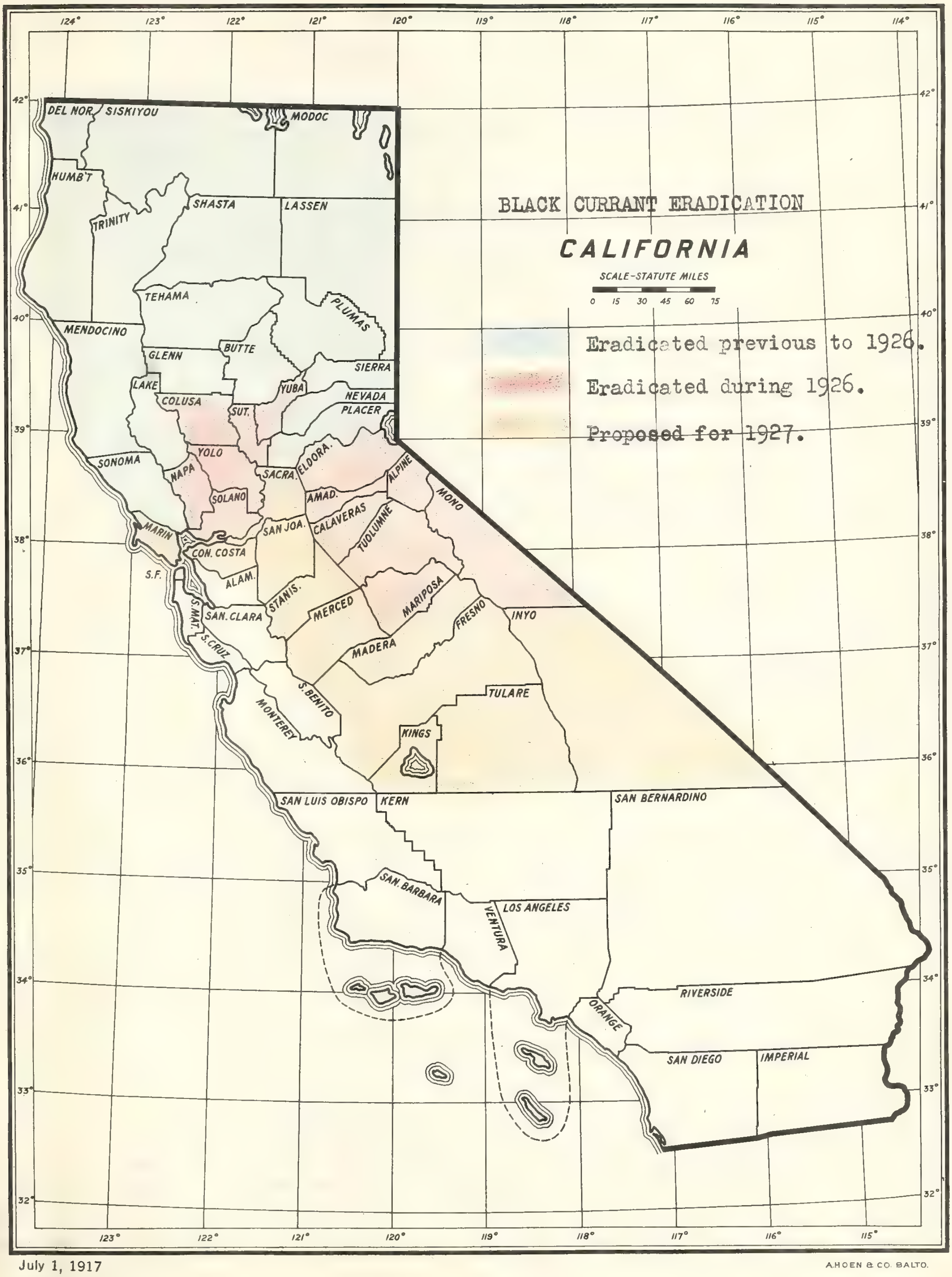
IV. Nursery Inspection

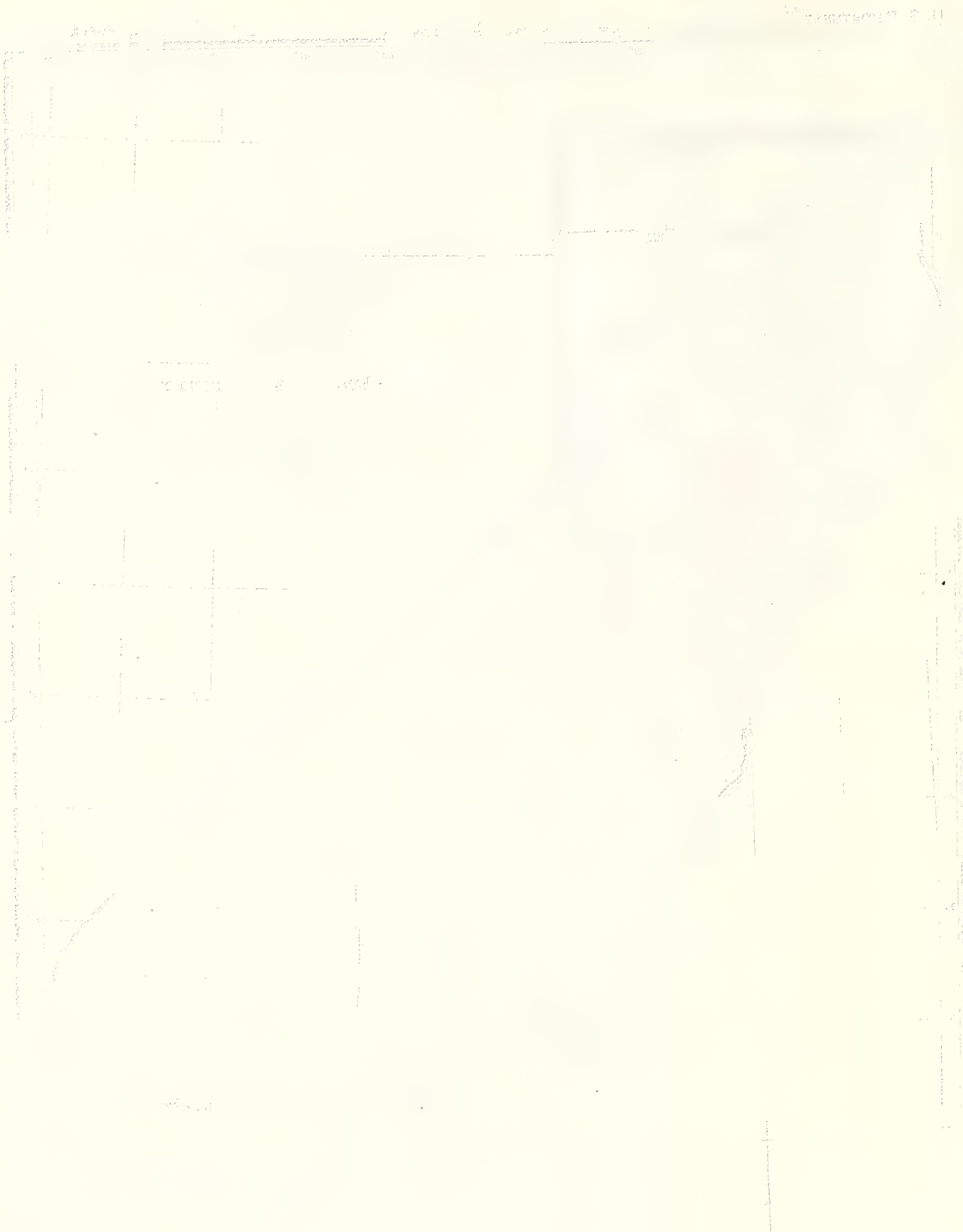
The inspection of nurseries is very well taken care of by the County Horticultural Commissioners, who have jurisdiction of the nurseries in their respective counties. The superintendent of Nursery Service of the State Department of Agriculture has rendered help to the blister rust office. The black currant eradication crews have visited the nurseries occurring in their territory. A sharp watch has been kept to see that no black currants occur in any of the nurseries.

New nurseries and there are gradually springing into being each year, some 200, have been written to or personally interviewed. There are at present about 1400 licensed nurseries. Of this number 27 formerly possessed black currants, but all destroyed an aggregate of 4971 bushes. It is believed that there are no black currants, R. nigrum, in any of the nurseries at the present time. Of the 1400 or more nurseries nor more than 34 grow the red currants or gooseberries. The 1925 census of these showed a total 53,000 red currants and gooseberries. The largest number, 27,000 were being grown by the M. J. Moniz nursery in Sonoma County.

Few if any nurseries are growing five needled pines, except the nursery of the State Board of Forestry, that of the Eddy Tree Institute and those of one or two lumber companies. The last census of the nurseries showed 17 possessing 1042 trees. About one-half of these are the remainder of former shipments of out of state origin, which were inspected some years ago but no disease was ever found among them.

The annual convention of the Association of California Nurserymen was held in Ontario, November 7 and 8. The general blister rust situation was explained to them concluding with the explanation of Federal Quarantine #63. This perhaps is of less importance to them than to the nurserymen of Oregon and Washington. Few Ribes are shipped out of the state; in fact the nurserymen expressed some satisfaction in being able to procure these bushes from Oregon again for their local trade.


BLACK CURRANT ERADICATION
CALIFORNIA
SCALE-STATUTE MILES
0 15 30 45 60 75
Eradicated previous to 1926.
Eradicated during 1926.
Proposed for 1927.
DEL NOR.
SISKIYOU
MODOC
HUMB'T
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
MENDOCINO
GLENN
BUTTE
SIERRA
LAKE
YUBA
NEVADA
COLUSA
SUT.
PLACER
YOLO
SONOMA
NAPA
SACRA.
ELDORA.
ALPINE
SOLANO
AMAD.
MONO
MARIN
SAN JOA.
CALAVERAS
TUOLUMNE
CON. COSTA
S.F.
ALAM.
STANIS.
MARIPOSA
MERCED
FRESNO
INYO
S. MAT.
SAN. CLARA
S. CRUZ
MADERA
S. BENITO
MONTEREY
TULARE
KINGS
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SAN. BARBARA
VENTURA
LOS ANGELES
RIVERSIDE
ORANGE
SAN DIEGO
IMPERIAL



V. Educational Work

1. Panel exhibits: These were used as formerly in connection with the black currant work. They still seem to be a good means for disseminating general blister rust information and were placed in conspicuous windows in some of the larger towns. These panels make a good basis for small fair exhibits.

2. The blister rust film: Many comments have been made in the past on the present blister rust film. The idea of motion pictures for widespread publicity is an excellent one but to get the most out of it for the work, a one-reel film is very desirable.

The film was shown in fourteen towns or cities. It also formed part of an agricultural program in one of the High Schools of the state.

3. Fair exhibits: The agricultural fair will always be one of the best agencies for blister rust exhibitions. It is probably the best meanso of bringing together the greatest number of people and presenting our problem first hand. Where an exhibit is placed at the same fair each year, it is desirable to change it each time. Exhibits were placed at the State Fair in Sacramento, the Ventura County Fair in Ventura and at the Marin County Fair at Novato.

4. Posters, bulletins and letters: The well known poster, "Save Your Pines" was sent to the postoffices in the several counties where the black currant eradication work was being conducted. It was gratifying to note that a considerable number were placed by the postmasters as requested and in the smaller places where they would create considerable interest. Several inquiries were received at the Sacramento office through the medium of these posters. All pertained to the dead and dying pines which supposedly were infected with blister rust but which on examination proved to be the work of other plant diseases or insect pests.

5. Newspapers: Blister rust articles were inserted in the local newspapers and often the editors gave "local color" to the articles which in turn would "take" better with the readers. It has been the policy of this office to supply material to the newspapers asking them to adhere strictly to the information thus given. This avoids misstatement of facts and there is less chance of misinterpretation on the part of the editors than where a verbal interview is given.

The Weekly News Letter of the State Department of Agriculture has furnished an outlet for blister rust news from time to time.

6. Talks: Several talks have been given during the past year. Mention of some has already been made under the various headings. In addition, a talk was given before a meeting of the Knights of the Round Table in Sacramento, an organization somewhat similar to the Kiwanis Club.

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Photographs, maps and specimens supplemented the remarks.

In keeping with Forest Protection Week of last April, a talk was broadcasted from radio station KQW, located in San Jose. One night a week is reserved for the State Department of Agriculture or its cooperative agencies.

VI. Scouting for the Disease

Aside from the usual inspection of the black currant plantings as found by the eradication crews, one general inspection trip was made into eastern California. The entire trip was in the sugar pine belt of the Sierra Nevada range. Reports had been received that the blister rust was present on pines, no particular species being designated. An inspection at these points revealed the presence of bark beetles, killing both yellow and sugar pines.

A portion of the area covered by the black currant scouts was within the range of the pinon rust. Special instructions were given the scouts to be particularly on the lookout in this region. Both wild and cultivated Ribes were inspected at different points. The pinon rust was found and specimens sent into Washington. There were no new developments and the findings were in keeping with those of former workers, who some years ago made an intensive study of this region. California is still apparently free from the white pine blister rust.

VII. Recommendation

These in the form of suggestions have been mentioned in the various topics previously discussed.

The black currant bill should again be introduced in the legislature which meets early in 1927. It undoubtedly will pass in this assembly and should receive the signature of the state executive. The time is ripe to have this law on the statute books.

METHODS AND CHECKING - CALIFORNIA

by

W. V. Benedict,
Junior Forester

This report summarizes the experimental work performed by the methods crew at the Blister Rust Camp near Pinecrest, California, on the Stanislaus National Forest during the 1926 field season.

The purpose of a methods organization in conjunction with the local control project is threefold:

(1) To check the efficiency of the eradication work, as an index to a crew's efficiency and as a means of determining the degree of protection resulting on the eradicated area.

(2) To improve old methods, and advance and test out new methods of eradication which will aid in lowering the cost of protection.

(3) To collect the proper field data to be used in the analysis and standardization of eradication records.

Organization of Crew

The methods crew, as organized for the California work, consisted of the project leader and one assistant. When more assistants were needed on experimental work, they were obtained from the eradication forces. On many occasions it was possible to make use of the regular crew work in conducting experiments, thus obviating any interference to eradication progress.

Checking

At least two percent of the area of all eradicated blocks was checked by the strip method. The blocks were checked as soon as the eradication crews had completed them.

The strip method of checking consisted in the running of parallel strips at uniform intervals across the block in such a direction as to best encounter average conditions. Two men constituted a checking crew, one man running compass and the other acting as recorder. Both searched for missed Ribes. Generally a rod wide strip was covered, but on the more open areas, where the visibility would permit, a strip two rods wide was checked. A sufficient number of strips were run across a block to give at least a two percent check, and the interval between strips was such as to have them occur uniformly over the entire block.

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When a rod wide strip was used an interval of $12\frac{1}{2}$ chains resulted in a two percent check. This interval was often maintained when a two rod strip was checked especially on the smaller blocks, being increased proportionally with the increase in size of blocks. This gave from a two to four percent check. Data were taken by the recorder on the attached forms #WF-22-BRC-5-22-26 and #WF-21-BRC-5-22-26. The starting point of each strip was permanently marked for future reference.

An absolutely impartial attitude was maintained in all checking work, and the predetermined spacing of strips aided in preventing the possibility of any personal element entering into the work. Care was taken in recording missed bushes, to be certain they were within the check strip. As soon as a block was checked the data were computed, to enable the eradication supervisor and crew foremen to know the efficiency of the work. Since blocks and types coincided, and each crew usually worked an entire block, an individual crew check and type check was also obtained for each block.

The advance plot method of checking was used on numerous occasions throughout the season for special purposes. Advance plots, varying in size from 1/10 to 1/2 acre were set out on a block in advance of eradication and all Ribes and feet of live stem contained thereon recorded. A crew, in the course of a day's work, eradicated the plots, and they were subsequently checked. This gave an absolute check on the plot, but the success of this system of computing eradication efficiency depended upon average conditions being secured in the plot selections. Advance plots were permanently located for future ecological studies.

Table No. 1. gives a complete list of all blocks eradicated during the season and the efficiency of eradication for each block.

Site of Missed Ribes

A list, according to the site on which found, was kept for each Ribes species checked during the season. The knowledge of where the Ribes were being missed was helpful in instructing crew men on being especially careful and alert in such locations. Table No. II. gives the number by sites of Ribes checked during the season and the percentage of the total checked on each site.

Table No. II.

	G. roezli		R. nevadense	
Site of Missed Ribes	No. Missed	% Missed	No. Missed	% Missed
Rockout crops	27	7.28		
Raised ground adjacent to mature trees	14	3.77		
Damp slope	73	19.67	13	22.41
Alder bottoms	5	1.35	2	3.45
Windfalls, under or behind	17	4.58	3	5.17
Dry draws	4	1.08	2	3.45
On decayed stumps or logs	2	0.54		
Mulch of decayed branches	25	6.74	2	3.45
In dense brush	145	39.09	4	6.90
On creek banks	25	6.74	31	53.45
Covered by pulled Ribes	8	2.15		
Dry slope	16	4.31		
In open	6	1.62	1	1.72
In bear clover	4	1.08		
Totals	371	100.00	58	100.00

Relation of Missed Ribes to Adjacent Brush

To aid in analyzing the reasons for missed bushes a record was kept throughout the season of the relation of missed Ribes to the surrounding brush and reproduction. The summarized results of this study are shown in Table No. III.

Table No. III.

	G. roezli		R. nevadense	
Relation to Surroundings	No. Missed	% Missed	No. Missed	% Missed
Hidden by Brush	57	15.35	1	1.72
Partially Hidden by Brush	151	40.70	13	22.41
Visible above brush	14	3.76	6	10.35
No brush near Ribes	149	40.19	38	65.52
Totals	371	100.00	58	100.00

Relation of Efficiency to Different Ribes Concentrations

The efficiency tabulations on Table No. I. are based on the relation of the number of missed bushes to the original number present on an area. It is apparent, that by this method of computing, an area originally containing a large number of Ribes may have a large number missed and still a high percentage of efficiency maintained. This is undoubtedly a mathematical condition. However, indications are that the number of Ribes missed by a crew is not directly proportional to the increase in numbers of Ribes on an area. Crews will miss more Ribes on areas of many Ribes than on areas containing less, but the number of bushes missed will not increase in a direct proportion. It is shown by the foregoing tabulation that the number of Ribes a crew will miss on any area, regardless of the original Ribes population, tends toward a constant number. A crew working in areas of large concentration might have a high percentage of efficiency and still be missing more Ribes than are present on another area before eradication. The true efficiency of eradication, from the standpoint of protection is not the percentage resulting from the relation of the number of bushes missed to the number originally on an area, but the number remaining on an area, after eradication, expressed in feet of leaf-bearing stem.

Methods

Under "Methods" is included the different experimental studies carried on in Ribes eradication, plot studies, and a general discussion more or less ecological in nature appertaining to eradication.

Brush Indicators

It was found that whenever buck-brush, generally known as spiny Ceanothus (Ceanothus cordulatus) occurs in large quantities on an area Ribes are also to be expected, in greater or lesser numbers, apparently depending upon the density of the Ceanothus and the amount of moisture present. The ground directly beneath the Ceanothus seems to be a favored spot for the germination of Grossularia roezli seeds. Many of the seedlings thus formed do not survive the first season but the many large bushes found in Ceanothus patches indicate that the site condition occupied by the Ceanothus is favorable to the development of the gooseberry. The heaviest concentrations of Ceanothus and gooseberries were found on the northern exposures.

The presence of manzanita (Arctostaphylos patula) on an area may or may not indicate the occurrence of Ribes. This species of brush, although not restricted to such, is chiefly found on southern exposures and generally indicates an area of very few Ribes. However, instances have been found on northern exposures where a heavy Ribes population occurred within manzanita patches.

On the sugar pine - yellow pine type (southern exposure) where manzanita and bear-clover (Chamaebatia foliolosa) constitute the chief ground cover, an occasional old Ribes may be found, but the presence of the bear-clover is sufficient indication that very few Ribes inhabit the area.

Scrubby chinquapin (Castanopsis sempervirens) which is often found growing in pure stands or in mixture with manzanita, is an indication of an area containing practically no Ribes.

In general the northern exposures contain the heavier concentrations of brush and Ribes and represent the hardest working conditions.

Seedling Studies

A seedling, as herein discussed, is considered to be any plant, of current season's germination, two inches or less in height. Previous to this season's work there have been no large numbers of seedlings reported by eradication men in the West. Their presence in large numbers on this eradication area greatly retarded the progress of eradication. On some of the areas worked early in the season seedlings constituted fully one half of the total Ribes. Since no one eradication type was worked thruout the entire season no extensive records on seedlings mortality are available; but sufficient data were obtained to verify the following observations.

(Grossularia roezli)

Seeelings of this species, while occurring beneath almost any shelter, were much more numerous under spiny Ceanothus. Many seedlings also occurred under coniferous reproduction and beneath the parent Ribes plant. During the fore part of the season seedlings were very numerous on brushy areas which necessitated a close crew formation in eradication. While the actual eradication of these small plants was a negligible matter, the searching beneath the brush for them consumed a great deal of a crew man's time. On the cut-over lands, eradicated during June and early July the seedlings were especially numerous. Since these areas were completed in July no further data were obtained on them. One small area in this type containing 100 seedlings was set aside as a plot to determine the mortality of the seedlings throughout the summer. By the end of July 50 of them had died. Early in August cattle trampled the plot obliterating all remaining plants.

(Ribes nevadense)

Seedlings of this species were restricted to the stream type being particularly numerous along the small creeks in mature timber. They were not found so much under cover of other vegetation but occurred in mixture with several species of annual weeds, and for this reason were hard to detect.

Along certain streams, seedlings of both _G. roezli_ and _R. nevadense_ were in evidense and where the plants were very young it was difficult for one untrained in Ribes taxonomy to distinguish one species from the other. As the plants became a little older, the currant leaves, upon being crushed emitted the typical currant odor. As soon as the plants were old enough for their leaves to assume their characteristic forms they were readily distinguishable.

Conclusion

Because such a small percentage of seedlings ever survive and reach maturity it seems to be a misdirected effort to eradicate them. As there is undoubtedly considerable seed still ungerminated in the soil, more seedlings will develop on an area the next season after eradication. When the plants from this stored up seed develop, a second eradication will be necessary. The seedlings could be left in the ground at the time of the first eradication, taking out all plants of a larger size, thus eliminating all seed bearing plants and preventing the formation of any new seed. Several years later, when all seed in the ground has germinated and before any of the seedlings have become old enough to bear fruit, a second eradication could be conducted which would eliminate the Ribes from the flora of the area.

Root and Crown Studies

Because of the extremely long dry season occurring in this locality it was thought that any serious interference with a plant's leaf-bearing stem would result in the death of the plant. Several plots were established on which the Ribes were eradicated in different manners. Some plants were cut off just above the ground, leaving the crown and root system intact; some just below the crown, leaving the remainder of the root system in the ground but exposed to the sun; and some just below the crown with the remainder of the roots covered with soil. These plots were established on all eradication types and were repeated each month. Each plant was staked and numbered for future observations. Examinations were made each month. Examinations made in July, August and September on plots established in June, July and August respectively, disclosed growth in all cases, on all sites, where any part of the crown had been left in the ground, and in no case was there any evidence of rejuvination where all the crown had been taken out.

Permanent One Acre Plot

A one acre plot 2 chains wide by 5 chains long in stream and northern exposure, mature timber type was established to obtain some information on the recurrence of Ribes on an eradicated area. Since the surrounding country is also eradicated the recurrence of Ribes on the plot will largely be the result of improperly eradicated bushes and germinated seed stored in the soil. Rodents and birds may bring in some seed from outside the protected area. The plot originally contained the following Ribes:

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Table No. IV.

Originally on Area						Checked and Pulled after Eradication					
G. roezli			R. nevadense			G. roezli			R. nevadense		
Mature Plants	Seedlings	F.L.S.	Mature Plants	Seedlings	F.L.S.	Mature Plants	Seedlings	F.L.S.	Mature Plants	Seedlings	F.L.S.
122	4	2597.7	25	5	226.7	3	10	5.6	2	3	2.1

The plot has been permanently marked and bounded for future observation. There are presumably no Ribes on the plot at the present time.

Permanent Ten Acre Plot

The Forest Service has established a permanent 10 acre (10 chains by 10 chains) on the logged-over land of the Cow Creek timber sale area. The purpose of this plot is to study reproduction conditions on timber sale areas, so as to ascertain the best methods of securing a good return of sugar pine. On this plot all of the ground cover influencing, logging and reforestation has been plotted and mapped for future study. In conjunction with this experiment this Office has, with the permission of the Forest Service, located all of the Ribes on the plot. A copy of a map of the plot with an over-lay of the Ribes of the plot attached, is on file in the office. The purpose of obtaining these Ribes data was to study the changing Ribes population on an area after logging.

Difficulty Factor Studies

A season's experience with the difficulty factor adopted in 1925 discloses it to have several defects, and that its application on an area does not give a true idea of the difficulty of eradication. In the first place this formula - i. e., $\frac{\%\ \text{Brush}}{4} + \frac{\%\ \text{Slope}}{4} + \frac{\text{Rock Outcrop}}{4} + \frac{\%\ \text{Windfalls}}{4}$ assumes these four factors to be of equal importance, which is not the case in this locality. The density and species of brush is by far the most influential in hindering progress. In the second place the slope factor is not a constant, but varies with the manner in which a crew works an area. If the crew were going up hill against brush, slope is important for in this situation progress is slow and difficult. If the crew were working along the contour or down hill, slope would not have the same effect upon progress. The windfall factor is unimportant since there is seldom any windfall present. The rock outcrops appreciably slow down crew progress when Ribes occur in the rocks because the bushes are hard to grub out but rocky areas containing no Ribes may aid progress by providing an opening in the brush.

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Difficulty Factor Studies

A season's experience with the difficulty factor adopted in 1925 discloses it to have several defects, and that its application on an area does not give a true idea of the difficulty of eradication. In the first place this formula - i. e., ¼ Brush + ¼ Slope + Rock Outcrop + ¼ Windfalls assumes these four factors to be of equal importance, which is not the case in this locality. The density and species of brush is by far the most influential in hindering progress. In the second place the slope factor is not a constant, but varies with the manner in which a crew works an area. If the crew were going up hill against brush, slope is important for in this situation progress is slow and difficult. If the crew were working along the contour or down hill, slope would not have the same effect upon progress. The windfall factor is unimportant since there is seldom any windfall present. The rock outcrops appreciably slow down crew progress when Ribes occur in the rocks because the bushes are hard to grub out but rocky areas containing no Ribes may aid progress by providing an opening in the brush.

The two major factors influencing the progress of eradication are brush cover (species and density) and Ribes (size and density). A method of measuring difficulty based chiefly upon these two factors was suggested to the methods crew.*

Ribes were classified according to sizes, A. B. C. and D. as follows:

Class A.

All bushes readily pulled by hand, ranging in height from a seedling to a plant containing four feet of live stem (the ease with which they pull and not the size being the determining factor).

Class B.

Plants readily taken out by one stroke of the Ribes tool, having from 4-60 feet of live stem.

Class C.

Plants requiring one man a little time in eradicating, having from 60 to 200 feet of live stem.

Class D.

Extremely large plants requiring one or two men several minutes to eradicate, containing over 200 feet of live stem.

The brush cover was classified, regardless of species, according to its impediment to progress, into four classes. When slope, windfall and rock outcrops were important they were included here. An area ordinarily falling into Class 1., might be put into Class 2. if the slope were steep or rock outcrops were prominent.

Class 1. - brush absent.
Class 2. - brush scattering.
Class 3. - brush heavy.
Class 4. - brush dense.

By combining these two factors in the following manner, a mental picture of the working conditions on an area is obtained.

*Suggested by A. Grasovsky

Table No. V.

	A.	B.	C.	D.
1.				
2.				
3.				
4.				

A serious obstacle to the use of this method was the inability to express the difficulty of working in some tangible form or formula.

Another method of obtaining the difficulty of work suggested to the methods crew was a modification of the formula adopted in 1925, prorating the weights given the different factors, according to their influence upon eradication, such as brush 80, slope 15 and rock outcrops 5, on the basis of 100. The relative influence of brush, slope, and rock outcrops on eradication progress varies in different localities making it difficult to attach the proper weight relations to the different factors.

Uphill versus Downhill Eradication

The slopes in general, were not of a sufficient steepness to have been a deciding factor in determining whether up-hill or down-hill procedure should have been followed. The method of working a block was largely up to the crew foremen. Because of the importance of water for the men, and due to its scarcity, the foreman usually planned his course to avail the crew of any water that might be in the vicinity. Later in the season, when it was necessary to carry water along with the crew the foreman usually worked around his block. This gave him a better idea of how much work remained on the block and when he could complete it.

Ribes Tools

During a scouting trip to the eradication area, prior to the opening of the camp, it was learned that the Ribes were of such a type as to generally require tool eradication, instead of hand pulling, as had been the practice on all western areas previously eradicated. The large size of the Ribes and their extremely long tap-roots made hand pulling an impossibility in many cases. In all cases tool eradication was the most satisfactory. Two types of eradication tools were used throughout the season; the common grub, or hazel hoe and a specially improvised tool, somewhat smaller and lighter than the grub hoe, but having a pick on one end. Each man in a crew was provided with a tool. The grub hoe was the tool most popular with the men regardless of its additional weight. However, two minor alterations to the smaller tool would improve its popularity and increase its effectiveness. One defect was in the shape of the blade, which was bowed in from the cutting edge

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toward the handle to lighten it. This resulted in the blade getting caught between the roots of the bush. Another defect was the lightness of the handle. By increasing the strength of the handle and tapering the blade the tool should prove satisfactory for eradication work.

After a few day's use the tools became dulled to an extent that their effectiveness was considerably reduced. The small grindstone at the camp was incapable of keeping the tools in good shape and next season it should be supplemented by a larger one.

Eradication Experiments

Methods of Eradicating South Exposures

Three similar 45 acre plots were laid out, adjoining each other, in sugar-pine-yellow pine type. The object of these plots was to obtain some data that would indicate the best method of procedure in eradicating such areas. Across each plot were three intermittent streams, emptying into the Tuolumne River, which formed the lower boundary of the plots. The largest percentage of the acreage in each of the plots was mature sugar pine-yellow pine, with very few Ribes. Most of the Ribes eradicated were found along the main stream and up the lower courses of the intermittent streams.

The plots as a whole were very sparsely populated with brush, the principal ground cover being bear clover, some manzanita, Ceanothus, coniferous reproduction, and pine needles. Along the upper boundary of the plot the only ground cover was pine needles. Lower down was found bear clover and a scattering of manzanita and Ceanothus, the brush density increasing near the main stream, but in no place becoming a serious factor in eradication.

Each plot was eradicated in a different manner as follows:

Plot 11-A.

The stream type was eradicated by a 5-man crew. The remainder of the block was scouted by a 2-man scout crew.

Note:-A portion of this plot was found to have been logged. It contained the most brush and Ribes.

Plot 11-B.

The entire plot was eradicated by the same 5-man crew.

Plot 11-C.

The stream type was eradicated by the same 5-man crew and the remainder of the plot was left unworked.

toward the handle to lighten it. This resulted in the blade getting caught between the roots of the bush. Another defect was the lightness of the handle. By increasing the strength of the handle and tapering the blade the tool should prove satisfactory for eradication work.

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The plots as a whole were very sparcely populated with brush, the principal ground cover being bear clover, some manzanita, Ceanothus, coniferous reproduction, and pine needles. Along the upper boundary of the plot the only ground cover was pine needles. Lower down was found bear clover and a scattering of manzanita and Ceanothus, the brush density increasing near the main stream, but in no place becoming a serious factor in eradication.

Each plot was eradicated in a different manner as follows;

Plot II-A.

The stream type was eradicated by a 5-man crew. The remainder of the block was scouted by a 2-man scout crew.

Note:-A portion of this plot was found to have been logged. It contained the most brush and Ribes.

Plot [illegible]

The entire plot was eradicated by the same 5-man crew.

Plot [illegible]

The stream type was eradicated by the same 5-man crew and the remainder of the plot was left unworked.

Each plot was checked by the checking crew with the following results:

Table No. VI.

Bush Efficiency

Plot No.	Ribes Missed		F.L.S. Missed		All Bushes		Over 6"		Over 12"		F.L.S.	Eff.
	Per Acre		Per Acre									
	G. r.	R.n.	G. r.	R.n.	G. r.	R.n	G. r.	R.n	G. r.	R.n	G.r.	R.n.
11-A	1.07	0	7.1	0	95.07	100	95.18	100	94.22	100	95.76	100
11-B	1.11	0	1.0	0	94.45	100	95.52	100	100	100	99.44	100
11-C	0.8	0	1.4	0	92.73	100	92.00	100	100	100	98.71	100

Note:-See Table No. I. for complete checking results on above plots.

In 11-A missed bushes were found in stream type, in 11-C in upland type.

The difficulties of working the plots and time required to eradicate them (in man days) are:

Table No. VII.

Plot No.	Difficulty of Working	Man Days required to eradicate	Acres per Man Day	Ribes per Man Day	Total Ribes on Plot
11-A	13.00	10	4.5	96.2	962
11-B	9.75	9	5.0	94.6	852
11-C	9.50	6	7.5	8.31	499

Significance of Results

The efficiencies of the three methods of eradication were so nearly the same that from this standpoint alone there would be little choice in the method adopted. The analysis of these data favors II-C or working the streams with a crew and leaving the remainder unworked. However, a precautionary remark is necessary: This type of country (sugar pine-yellow pine) often contains local limited areas of rock outcrops. Within these rocky areas Ribes are very likely to be found. Before an area should be designated as Ribes free it would be advisable to have a scout go over the area and locate the Ribes patches.

Crew Size Experiments

At the beginning of the field season a crew of five men, with a foreman checking behind, was adopted to best meet the conditions encountered on the California area. As the season advanced method studies on crew work, time analysis of a crew's working time and the results of the checking work indicated that on certain areas a different crew formation might prove more efficient. Different formations were tried out, the results in general indicating that no one formation was best suited to all conditions. In general, the better the men, the larger the crew and the wider the interval between men.

The following table compares the results of the work of a 5-1 crew, 4-1 crew, 3-1 crew and special 4-0 crew.

Table No. VII-A

Stream-Mature Type

Crew Size	Acreage of Plot	Man days to eradi-cate	Ribes pulled on Type	Ribes per Acre	Ribes per man day	Acres per man day	Bushes missed per Acre	F.L.S. missed per Acre	Diffi-culty factor
3-1	40	13	1095	27+	84+	3	7.0	4.6	8.50
4-1	45	26	4685	104	180	1.75	6.0	2.2	13.00
5-1	30	37.5	5362	178.7	143	0.80	13.2	7.8	27.00

Note:-See Table No. VIII. for crew time analysis figures on 4-1 and 5-1 crews.

North Exposure-Mature Type

Crew Size	Ribes per acre	Ribes per man day	Acres per man day	Bushes missed per Acre	F.L.S. missed per Acre	Difficulty Factor
5-1	30	107	3.5	1.0	2.5	13.25
4-0	27.4	269	9.0	6.5	33.0	9.50

On the plots in the stream-mature type the number of Ribes and working conditions varied considerably but it was hoped that the relative merits of the three crew formations would give at least a general indication of the one best adapted to this type of working conditions.

The plots on the northern exposure-mature type were as nearly alike as it was possible to obtain. In the 4-0 formation a special crew consisting of the higher salaried men of the camp without a checker, worked the area. The absence of a checker and the high speed resulted in a reduced efficiency.

Crew Time Analysis

During the course of the field season a complete time analysis of a crew's working time on different types and for different crew formations was made. A record was kept for an eight hour day's work over a period of 14 working days on the following.

(1) travel time, time of travel one way, from camp to place of work.
(2) searching time, time spent looking for Ribes bushes.
(3) digging time, time required to eradicate the Ribes bushes.
(4) waiting time, time lost by part of crew while part is engaged in searching or digging.
(5) resting time, time taken by entire crew for drinks or a rest.

In securing these data one member of an eradication crew was timed throughout the day and a list was kept of the Ribes pulled by him and by the entire crew. The following table constitutes the tabulated results of this analysis:

Table No. VIII

Crew Time Analysis

Type	Digging Time Minutes	% of total time	Searching Time Minutes	% of total time	Waiting Time Minutes	% of total time	Resting Time Minutes	% of total time	Traveling Time Minutes	% of total time	Total time on job	Ribes pulled by man checked	Ribes pulled by crew	Size of crew
Cut-over N. Exp.	71	14.8%	250	52.09%	124	25.82	20	4.17%	15	3.12%	480	344	1178	5-1
"	66	13.75	315	65.62	63	13.13	27	5.62	9	1.88	480	195	978	5-1
"	131	27.30	213	44.37	111	23.13	20	4.17	5	1.03	480	338	1515	5-1
"	42	8.75	300	62.50	92	19.17	23	4.79	23	4.79	480	228	919	5-1
Ave.	77.5	16.15	269.5	56.15	97.5	20.31	22.5	4.69	13	2.70	480	276.25	1174.5	
Mature N. Exp.	80	16.67	299	62.29	61	12.70	20	4.17	20	4.17	480	151	502	4-1
"	78	16.25	274	57.08	[illegible]	20.42	20	4.17	10	2.08	480	158	679	4-1
"	62	12.91	245	51.04	133	27.71	20	4.17	20	4.17	480	134	679	5-1
"	39	8.12	375	78.12	26	5.42	20	4.17	20	4.17	480	103	249	4-1
"	39	8.12	324	67.50	72	15.00	25	5.21	20	4.17	480	128	495	4-1
"	34	7.08	332	69.17	49	10.21	20	4.17	45	9.37	480	53	288	4-1
"	43	8.96	288	60.00	99	20.62	10	2.08	40	8.34	480	166	514	5-1
Ave.	53.57	11.16	305.3	63.60	76.9	16.02	19.3	4.02	25.0	5.20	480	127.6	501	
Mature Stream	113	26.90	199	47.38	93	22.14	10	2.39	5	1.19	420	304	1449	5-1
"	31	6.08	299	58.63	137	26.86	10	1.96	33	6.47	510	198	407	5-1
"	82	17.08	234	48.75	122	25.42	10	2.08	32	6.67	480	186	740	5-1
Ave.	75.3	16.03	244	51.92	117.3	24.96	10	2.13	23.3	4.96	470	229.3	866	

Table No. VIII.-A

Time Analysis of Four and Five Man Crews

From Data Shown in Preceding Table

Type	Digging Time Minutes	% of total time	Searching Time Minutes	% of total time	Waiting Time Minutes	% of total time	Resting Time Minutes	% of total time	Traveling Time Minutes	% of total time	Total time on job	Ribes pulled by man checked	Ribes pulled by crew	Size of crew
Cut-over N. Exp.	77.5	16.15	269.5	56.15	97.5	20.31	22.5	4.69	13	2.70	480	276.25	1174.5	5-1
Mature N. Exp.	62.	12.91	245	51.04	133	27.71	20	4.17	20	4.17	480	134	679	5-1
"	43	8.96	288	60.00	99	20.62	10	2.08	40	8.34	480	166	514	5-1
Stream Mature	75.3	16.03	244	51.92	117.3	24.96	10	2.13	23.3	4.96	470	229.3	866	5-1
Ave.	64.37	13.48	261.6	54.82	111.7	23.40	15.6	3.26	24.1	5.04	477	201.39	808.4	5-1
Mature N. Exp.	80	16.67	299	62.29	61	12.70	20	4.17	20	4.17	480	151	502	4-1
"	78	16.25	274	57.08	98	20.42	20	4.17	10	2.08	480	158	679	4-1
"	39	8.12	375	78.12	26	5.42	20	4.17	20	4.17	480	103	249	4-1
"	39	8.12	324	67.50	72	15.00	25	5.21	20	4.17	480	128	495	4-1
"	34	7.08	332	69.17	49	10.21	20	4.17	45	9.37	480	53	288	4-1
Ave.	54	11.25	320.8	66.83	61.2	12.75	21	4.38	23	4.79	480	118.6	442.8	4-1

These data indicate that the more Ribes there are on an area the more time there will be spent by the crew in digging, the less time in searching, and the more lost time there will result by some members of a crew waiting while part of the crew dig. In comparing the four man crew to the five man crew it will be noted that there is less lost on waiting time in the four man crew. While this study may not give conclusive evidence of the fact the general indications are that the crew may be increased in size with the increase in number of Ribes on an area.

The amount of searching time is directly proportional to the number of Ribes per acre, lessening as the number of Ribes increase. The digging time increases as the number of Ribes increase.

In judging the relative merits of the four man crew and the five man crew consideration must be given to the number of Ribes per acre. The crew analysis data shows the least idle time for the four man crew, but on areas with a dense Ribes population it would undoubtedly prove more satisfactory to increase the size of the crew. Further studies might indicate the point in the number of Ribes per acre where it would be more satisfactory to increase the size of the crew.

String versus Paper as a Guide Trail

It has been the usual practice in previous years to use small paper squares (2.0" x 2.5") in marking the boundaries of completed strips in systematic Ribes eradication. This method of procedure has several disadvantages:

(1) On certain areas the use of paper delays the forward movement of the crew.

(2) Because of the low visibility of the paper the flank men in the crew can only work one half the area the inner men work because they have to follow or lay the paper squares.

(3) The efficiency of the end men is lowered since they spend part of their time in laying or following trail.

In hopes of overcoming these disadvantages the use of ordinary grocer's twine was suggested to the methods crew as a substitute for the paper squares and the following discussion covers the results of several experiments with twine.

One of the experimental areas on which string was used consisted of 168 acres of sugar pine-white fir type. The working conditions varied considerably throughout the block, there being limited areas of open timber reproduction thicket, manzanita thicket, buck brush patches, and a combination of all three. With this variation in ground cover was an equal variation in Ribes distribution. Strips were run across the area in such a manner as to encounter as many of the above conditions as possible within each strip. There was, however, considerable variation between strips due to local changes in brush species and density within a type.

In the eradication of this block three methods of following trail were used:

1-Parallel string lanes, run in by compass ahead of the crew.

2-String trail, run in by the crew as it advanced, a ball of twine taking the place of the paper bag.

3-Paper trail, the regular method of laying trail.

The following data were taken on each strip:

(a) Actual working time.
(b) Number of Ribes, by species.
(c) The difficulty of eradication (difficulty factor)
(d) The efficiency of eradication.

Another experimental area on which string and paper were compared consisted of 71.6 acres of brushy sugar pine-white fir. This entire area was as uniform in Ribes distribution and working conditions as it was possible to obtain, and represented the maximum difficulty of eradication encountered during the season. One part of the area was worked by a four man crew following string lines, and one part was worked by the four man crew following paper trail.

Two methods were used in running in advance string lines. One method was to arrange the spindle of twine on an axis in a small box strapped on a man's back in such a manner that the twine would unreel. The other method was to fit a handle into the spindle on which the twine was wound the spindle being either carried in the hand or fastened to the belt. Both methods worked satisfactorily.

The following tables contain the analyzed data on these experiments:

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The following tables contain the analyzed data on these experiments:

Table No. IX

String Lanes Run in Ahead of Crew

Total Working Time	Total Acres Worked	Total Ribes Pulled	Man Days to Eradicate	Difficulty Factor
7 hr. - 5 Min.	8.3	641	4	Slope 15 Brush 33
7 hr. 20 Min.	8.2	525	4	Rock outcrop 1
6 hr. 55 Min.	8.4	569	4	
21 hr. 20 Min.	24.9	1735		12.25

String Run in by Crew

6 hr. 45 Min.	10.0	298	5	Slope 26 Brush 26
6 hr. 40 Min.	10.0	325	5	
7 hr. 15 Min.	14.0	249	5	Rock outcrop 1
20 hr. 40 Min.	34.0	872	15	13.25

Paper

7 hr. 5 Min.	9.0	339	5	Slope 25 Brush 10
7 hr. 20 Min.	10.0	464	5	
7 hr.	8.00	247	5	Rock outcrops 1
7 hr. 15 Min.	9.0	554	5	
7 hr. 15 Min.	9.0	370	5	
35 hr. 55 Min.	45.0	1974	25	9:00

Guide Trail used	Ribes per Acre	Ribes per man day	Acres per Man Day	No. Bushes missed per Acre	F.L.S. missed per acre	Bush Efficiency
String Lanes	69.6	144.5	2.07	0	0	100
String Line	25.6	58.1	2.26	4	1.20	86.21
Paper Squares	43.6	78.9	1.80	4	6	

Table No. X.

Four Man Crew - String Trail

Total Working Time (Hours)	Total Acres Worked	Total Ribes Pulled	Man Days to Eradicate	Difficulty Factor
7 hr. 35 Min.	6.1	800	5	Slope 28
7 hr. 0 Min.	5.0	368	5	Brush 88
6 hr. 30 Min.	5.0	285	5	
7 hr. 05 Min.	5.0	615	5	
7 hr. 15 Min.	5.0	553	5	
7 hr. 05 Min.	5.5	536	5	
5 hr. 40 Min.	5.0	435	5	
48 hr. 10 Min.	36.6	3592	35	29:00

Four Man Crew - Paper Trail

7 hr. 10 Min.	7.00	493	5	Slope 28
7 hr. 40 Min.	8.50	865	5	Brush 88
7 hr. 10 Min.	7.75	415	5	
7 hr. 20 Min.	4.50	895	5	
7 hr. 20 Min.	2.75	1316	5	
7 hr. 30 Min.	2.50	1294	5	
5 hr. 30 Min.	2.75	678	5	
49 hr. 00 Min.	35.75	5956	35	29:00

Guide Trail Used	Ribes per Acre	Ribes per Man Day	Acres per Man Day	No. Bushes missed per Acre	F.L.S. missed per Acre	Bush Efficiency
String	98.14	102.62	1.04	14.7	94.7	79.68%
Paper	166.85	170.17	1.02	16.1	96.8	86.91%

In Table No. IX the string shows up as the better guide trail and in Table No. X. the paper shows up better.

Because of the variation in the flora and topography of any limited area and due to the personal variation in the working ability of the men, experiments on a large scale and covering a long period of time should be conducted before a reliable comparison between paper and string can be obtained.

The following personal observations on the use of string and paper as guide trail were made during the season.

(1) The visibility of string is higher than that of paper, which permits the flank man to cover a full width strip. In extremely brushy country where progress is slow this advantage may be lost.

(2) Methods studies have shown that it takes more time to hang the paper squares up in brush and reproduction than it does to lay all paper on the ground or lay string. In brushy country containing Ribes there is sufficient time to lay a well defined paper trail without interfering with the progress of the crew.

(3) Since it is the practice in this locality to graze stock throughout the forest during the summer, string run in ahead of eradication is likely to be carried away. Considerable damage resulted to string lines on certain areas. Numerous campers and tourists add to this difficulty.

(4) Crew foremen favored the string because its increased visibility made checking behind the crew easier.

(5) The cost of string was 45¢ per lineal miles and the cost of paper was 30¢ per lineal mile.

Advance Plot Studies

Throughout the field season advance plot studies were made on the different eradication types. On each type numerous one-tenth to five-tenth acre plots were established ahead of eradication crews, and the number of Ribes and feet of live stem recorded. When the crew eradicated the area, the length of time they spent on the plot was recorded. The plots were later checked for efficiency. Each plot represented different Ribes concentrations on the type. The following table gives the tabulated results of the 50 advance plots:

Table No. XI

Advance Plot Studies

Type	Area of Plot (acres)	Time to work Plot (min.)	No. of Ribes on Plot G. r.	R. n.	Total	F. L. S. on Plot G. r.	R. n.	Total	No. of Ribes missed G. r.	R. n.	Total	F. L. S. Missed G. r.	R. n.	Total	Efficiency % by No. of Bushes	by % F.L.S.	Size of Crew	Block No.	Difficulty Factor	Trail
Stream Mature	0.1	12	6	0	6	24.5	--	24.5	0	0	0	0	0	0	100	100	5-1	20	9.50	P
"	0.1	7	4	0	4	19.0	--	19.0	2	0	2	7.5	0	7.5	50	60.53	5-1	20	9.50	P
"	0.1	3	0	0	0	0	0	0	0	0	0	0	0	0	--	--	5-1	20	13.25	P
"	0.1	6	5	0	5	80.0	0	80.0	0	0	0	0	0	0	100	100	4-1	25	9.25	P
"	0.3	33	51	47	98	257.4	192.8	450.2	5	5	10	6.5	0.7	7.2	89.80	98.18	4-1	25	4.00	P
"	0.1	13	1	153	154	1.0	31.5	32.5	0	20	20	0	2.6	2.6	87.02	92.00	4-1	25	0.50	P
"	0.1	7	11	11	22	38.3	4.4	42.7	10	2	12	1.0	0.8	1.8	54.55	95.74	5-1	21	7.00	P
"	0.2	55	36	240	276	180.3	143[illegible].7	1620.0	3	21	24	6.0	32.0	38.0	91.31	97.66	5-1	17	36.00	P
"	0.1	24	22	59	81	124.2	526.3	650.5	0	5	5	0	2.8	2.8	93.83	99.57	5-1	13	--	P
"	0.1	8	8	1	9	36.5	1.0	37.5	1	0	1	0.6	0	0.6	88.89	98.40	4-1	12	--	--
"	0.1	6	9	0	9	100.5	0	100.5	0	0	0	0	0	0	100	100	4-1	12	--	--
"	0.1	9	1	9	10	3.5	33.5	37.0	0	1	1	0	0.5	0.5	90.00	98.65	4-1	12	--	--
"	0.1	80	124	171	295	91.0	351.4	442.4	0	0	0	0	0	0	100	100	4-1	12	--	--
"	0.1	43	3	35	38	58.0	467.4	525.4	0	6	6	0	2.1	2.1	92.11	99.61	4-1	12	--	--
"	0.1	29	34	9	43	150.8	5.2	156.0	3	3	6	0.3	2.6	2.9	86.05	98.79	4-1	10	--	--
"	0.1	39	11	43	54	10.8	8.5	19.3	0	3	3	0	1.1	1.1	94.45	94.30	4-1	10	--	--
"	0.2	24	59	3	62	197.5	10.5	208.0	7	2	9	9.2	9.5	18.7	85.97	91.01	4-1	10	--	--
"	0.3	25	65	2	67	212.2	12.0	224.2	4	2	6	0.8	1.0	1.8	91.05	99.20	5-1	4	--	--
"	0.2	11	16	0	16	9.0	0	9.0	8	0	8	0.8	0	0.8	50.00	91.12	5-1	4	--	--
Total	2.6	434	466	783	1249	1594.5	3084.2	4678.7	43	70	113	32.7	55.7	88.4	90.96	98.07				
Per Acre	1	164.8	179.2	301.1	480.3	613.2	1186.2	1799.4	16.9	26.9	43.8	12.6	21.4	34.0	90.88	98.11				
Plot Average	0.13	22.8	24.5	41.2	65.7	83.9	162.3	246.2	2.2	3.7	5.9	1.7	2.9	4.6	91.02	98.13				
N. Exp Mature	0.1	4	3	0	3	30.0	0	30.0	0	0	0	0	0	0	100	100	4-1	8	12	--
"	0.1	7	11	0	11	81.8	0	81.8	3	0	3	6.1	0	6.1	72.73	92.55	4-1	8	--	--
"	0.1	9	7	0	7	93.2	0	93.2	2	0	2	0.2	0	0.2	71.43	99.79	4-1	14	9.50	--
"	0.1	7	8	0	8	30.0	0	30.0	0	0	0	0	0	0	100	100	4-1	14	--	--
"	0.1	17	4	29	33	10.1	59.0	69.1	1	4	5	0.1	3.8	3.9	84.85	94.36	4-1	14	--	--
"	0.1	11	9	0	9	60.0	0	60.0	0	0	0	0	0	0	100	100	4-1	8	--	--
"	0.1	4	6	0	[illegible]	17.3	0	17.3	1	0	1	0.1	0	0.1	83.34	99.43	5-1	8	--	--
"	0.1	9	28	[illegible]	30	95.5	20.5	116.0	1	0	1	2.2	0	2.2	96.67	98.97	4-1	14	--	--
"	0.1	4	3	0	[illegible]	40.0	0	40.0	0	0	0	0	0	0	100	100	5-1	8	--	--
"	0.1	3	0	0	0	0	0	0	0	0	0	0	0	0	--	--	5-1	8	--	--
"	0.2	5	1	0	1	22.0	0	22.0	0	0	0	0	0	0	100	100	5-1	8	--	--
"	0.1	7	7	0	7	40.5	0	40.5	0	0	0	0	0	0	100	100	5-1	8	--	--
"	0.2	5	10	0	10	46.1	0	46.1	3	0	[illegible]	2.4	0	2.4	70.00	94.80	5-1	26	--	--
"	0.2	8	7	1	8	14.3	2.5	16.8	1	0	1	1.0	0	1.0	87.50	94.05	5-1	26	--	--
"	0.1	7	12	1	13	193.4	0.5	193.9	0	0	0	0	0	0	100	100	5-1	26	--	--
"	0.2	8	13	2	15	103.2	2.6	105.8	0	0	0	0	0	0	100	100	5-1	26	--	--
"	0.1	7	4	0	4	11.1	0	11.1	1	0	1	0.7	0	0.7	75.00	93.70	4-1	22	8.25	String Lane*
"	0.1	11	24	0	24	285.0	0	285.0	0	0	0	0	0	0	100	100	4-1	22	4.0	String Lane
"	0.1	5	4	0	4	43.5	0	43.5	0	0	0	0	0	0	100	100	4-1	22	13.0	String Lane
"	0.1	1.5	0	0	0	0	0	0	0	0	0	0	0	0	--	--	4-1	22	0.0	String Lane
"	0.1	15	36	0	36	219.0	0	219.0	0	0	0	0	0	0	100	100	4-1	22	3.0	String Lane
"	0.2	54	58	0	58	384.8	0	384.8	6	0	6	10.8	0	10.8	89.66	97.17	4-1	22	33.0	P
"	0.1	13	56	0	56	619.3	0	619.3	1	0	1	1.0	0	1.0	98.22	99.84	5-1	22	8.0	P
Total	2.8	220.5	311	35	346	2440.1	85.1	2525.2	20	4	24	24.6	3.8	28.4	93.07	98.83	--	--	--	--
Per Acre	1	79.1	111.1	12.5	123.6	871.5	30.4	901.9	7.1	1.4	8.5	8.8	1.3	10.1	93.13	98.88	--	--	--	--
Average	--	91.9	135.2	15.2	150.4	1060.9	37.0	1097.9	8.7	1.7	10.4	10.7	1.6	12.3	93.09	98.88	--	--	--	--
S. Exp. Cut-over	0.5	41	81	0	81	1311.3	0	1311.3	13	0	13	5.0	0	5.0	85.11	99.62	5-1	--	10	
"	0.1	15	25	0	25	290.3	0	290.3	18	0	18	10.8	0	10.8	28.00	96.28	5-1	--	18.50	
"	0.3	17	58	1	59	219.5	0.5	220.0	30	1	31	6.0	0.5	6.5	41.16	97.05	5-1	--	--	--
"	0.2	5	4	0	4	41.0	0	41.0	1	0	1	0.1	0	0.1	75.00	99.76	5-1	--	--	--
"	0.2	6	17	0	17	113.0	0	113.0	2	0	2	2.5	0	2.5	88.24	97.79	5-1	--	--	--
Total	1.3	84	185	1	186	1975.1	0.5	1975.6	64	1	65	24.4	0.5	24.9	65.06	98.77	5-1	--	--	--
Per Acre	1.0	64.3	142.7	0.7	143	1519.3	0.3	1519.7	49.2	0.7	50	18.7	0.3	19.0	65.04	98.75	5-1	--	--	--
Average	0.26	16.8	37	0.2	37.2	303.8	0.1	303.9	12.8	0.2	13	4.8	0.1	4.9	65.06	98.72	5-1	--	--	--
N. Exp. Cut-over	0.3	35	40	10	50	188.0	0	188.0	10	0	10	1.0	0	1.0	80.00	99.47	5-1	--	--	--
"	0.2	7	6	0	6	67.0	0	67.0	0	0	0	0	0	0	100	100	5-1	--	--	--
"	0.2	8	14	0	14	55.3	0	55.3	1	0	1	1.0	0	1.0	92.86	98.20	5-1	--	--	--
"	0.3	31	76	0	76	822.5	0	822.5	5	0	5	1.0	0	1.0	93.43	99.88	5-1	--	--	--
Total	1.0	81	136	10	146	1141.8	0	1141.8	16	0	16	3.0	0	3.0	89.05	99.74	--	--	--	--
Per Acre	1.0	81	136	10	146	1141.8	0	1141.8	16	0	16	3.0	0	3.0	89.05	99.74	--	--	--	--
Average	0.2	20.2	34	2.5	36.5	285.4	0	285.4	4	0	4	0.7	0	0.7	89.05	99.76	--	--	--	--

Cost of Checking and Methods

Total Cost

Meals charged to methods and checking 589 @ .46¢	$270.00
Overhead, distributed on basis of meals	26.93
Salary of methods and checking men	758.93
Expenses of methods and checking men (Expenses incurred in operating personally owned car at .07¢ per mile to and from study areas.)	75.90
Equipment charge	26.53
Total	$1158.29
Total cost per acre for methods and checking	.37

Checking cost (including plot work to ascertain F. L. S. and Ribes sizes). Based on 66 man days.

Meals	$94.50
Overhead	9.43
Salary	265.62
Expenses	26.56
Equipment charge	9.29
Total	$405.40
Total cost per acre	.12

Checking cost (excluding plot work) based on 45½ man days

Total cost	$254.37
Cost per acre	.08

CONTROL RECONNAISSANCE IN CALIFORNIA

by

Edgar C. Kenyon,
Agent.

* * *

Control reconnaissance is the acquisition by field observations and available supplementary data of all information on certain pine areas relative to factors influencing in any way the adequate protection of such areas from damage by white pine blister rust.

This information forms a basis of control from which general cost data and plans for protection may be worked out and put into effect.

The area covered during this year's field season by reconnaissance lies within the boundaries of Township 4 N., Range 18 E., Mt. Diablo Meridian. This township is located in the center of the north half of the Stanislaus National Forest on the western slope of the Sierra Nevadas, at an elevation ranging from 5000 to 7000 feet. It includes roughly the drainage at the headwaters of the North Fork of the Tuolumne River and the South Fork of the Stanislaus River.

This area lies within the optimum range of sugar pine (Pinus lambertiana) and includes varying conditions of site, age and type, thus making it particularly suitable for eradication and control reconnaissance studies. It is within 40 miles of Sonora, California, a town of 5000 inhabitants and is connected with it by a good dirt road. The area itself is made readily accessible by a network of roads, trails and logging railroad grades.

The general drainage of the area is toward the southwest, the slopes having a corresponding exposure and varying in degrees of steepness from 100% to generally less than 30%.

On the northern exposures a combination of sugar pine-white fir (Abies concolor) with a scattering of incense cedar (Libocedrus decurrens) is found while on the southern slopes there is generally present the sugar pine-yellow pine (P. ponderosa) type, both exposures having various age classes represented thereon.

Ceanothus (Ceanothus cordulatus) and manzanita (Arctostaphylos patula) are generally found on both exposures, chinquapin (Castanopsis sempervirens) being generally noted on southern exposures. Mountain misery (Chamaebatia foliolosa) frequently covers the forest floor in open mature sugar pine-yellow pine on southern exposures.

Brush varies from 1 to 100% in density and in height from one foot for mountain misery to ten feet for manzanita and chokecherry (Prunus demissa). The latter is generally present on southern exposures near the crests of ridges.

Mountain meadows occur throughout the area, two being of considerable extent.

Rocky granitic soils and lava rock outcroppings are found in varying degrees throughout the area.

Logging operations are being carried on in the north central part of the township by the Standard Lumber Company. From one to five year old logged area conditions are found on sections adjacent to those being logged at present.

The general method followed in making the reconnaissance has been that of the strip system--running once through a forty with a two-man crew. The equipment necessary for this work consists of a $2\frac{1}{2}$ chain steel tape and hand compass together with blank forms, pencils and form holders.

Offsetting ten chains along the section line from the section corner, the direction of the offset depending upon the topography of the country, it being desirable to cross creeks and ridges at as near right angles as possible, a compass and chain line is run through the first tier of forties, data being taken on a strip $\frac{1}{2}$ chain wide. Again offsetting at the end of the mile a similar strip is run back through the next tier of forties. At the completion of this second strip a check is made as to the accuracy of the line run by tying in to the quarter corner. The remainder of the section is worked similarly.

The following data are noted on a blank form in appropriate columns at the end of each $2\frac{1}{2}$ chain transect:

1. Number of Ribes in relation to their size and difficulty of eradication

The following limits have been established as an aid to classification:

Table No. I.

Class	Feet of Live Stem
A	Up to 4
B	4 to 60
C	60 to 200
D	200 Up

6. Stage of development of timber e.g. reproduction, mature-reproduction. An average over each transect is recorded.

7. Difficulty factor. The conditions determining the factor to be applied to each transect are the same as those considered when applying a factor to the individual Ribes.

8. Remarks: The following points are noted:

a. Density of brush, using 10 as indicative of maximum brush density.
b. Kinds of brush e.g. buckbrush, chinquapin.
c. Percent and direction of slope.
d. Any particular characteristics of the transect e.g. very rocky, logged.

9. Topographical features including roads, streams, railroads, ridges, meadows, buildings and lakes.

Since the objective of reconnaissance is to give all information possible in regard to the area to be eradicated, to those in charge of eradication, the following plan has been followed as best suited for this purpose.

All topographical features are recorded on a map sheet on a scale of 8" to the mile, divided into 2½ chain squares. Using colored crayons, each square along the strips run is colored to indicate the difficulty factor for that transect. Four different colors are used to represent the four factors of difficulty the darker colors denoting greater difficulty.

On one side of this colored line another line is drawn or dotted in green to indicate many or few sugar pine. Similarly on the opposite side one in red is drawn to indicate whether the Ribes population is dense, scattering or absent.

Thus, at a glance one has a general picture of the section in regard to topography, difficulty factors encountered and prevalence of sugar pine and Ribes.

As a supplement to this sheet another map sheet of similar proportions, but transparent, is placed on the colored sheet and Ribes areas are blocked out. Using this latter sheet as a working plan scouts are more readily able to block out such areas in the field.

The method followed in reconnaissance this year was decided upon as that most suitable under existing conditions. Previous to this year no work on control reconnaissance had been carried on in California. In an entirely new field it was thought advisable to make rather an

intensive reconnaissance with a view toward extending the system as the knowledge of conditions become better known.

Work on reconnaissance was divided into three distinct divisions of area:

1. A reconnaissance of the area to be eradicated during the remainder of the field season of 1926, the object being to check reconnaissance results against eradication results.

2. A reconnasisissance of areas contiguous to the 1926 eradication area in order to apply eradication costs as determined by this year's eradication work.

3. A reconnaissance of the area to be eradicated during the field season of 1927.

The following table classifies, under these three divisions, the work performed:

Table No. IV.

Divisions	No. of Miles of Strip	No. of Sections	Sections	Acreage
1926 Eradication Area	12	3	28,21,16	1920
Contiguous to 1926 Eradication Area	26	7	30,33,27, 22,34,23,26	4160
1927 Eradication Area	21	6	2,3,4,9, 10, 11	3360
Total	59	16	--	9440

It is believed that the work done by reconnaissance this year will prove to be useful to the eradication force during the coming year. The areas reconnasissanced for eradication in 1927 have been blocked out by scouts from information obtained by reconnaissance. Topography and conditions over the area have checked out quite well. Actual data on number of Ribes per acre can only be determined from compilations after eradication.

Plans, based on reconnaissance work, drawn up and followed in the eradication of sections 28 and 21 proved to be satisfactory, although the eradication Ribes count was considerably higher than that obtained by reconnaissance.

That there should be a difference existing on a section is only to be expected considering Ribes growth habits and the small percentage of area covered. To obtain a Ribes count at all equal to the eradication

count would necessitate a much more intensive system of reconnaissance. By crossing streams and ridges at right angles, an average of existing conditions is obtained over an area. The result of such a Ribes count shows roughly those areas which should be worked intensively by crews, and those areas which can be worked by scouts.

If enough sections were to be reconnaissanced over an area and then checked by eradication a correction factor could be obtained and applied to the Ribes count in order to arrive at the true number for each section and eradication type.

The total combined cost of reconnaissance and ecology in California this year was $1061.06. Reconnaissance cost $930.25 and ecology $130.81. This is classified as follows:

Reconnaissance

Table No. V.

Salaries	Expenses	Subsistence	Overhead	Equipment	Total
$599.54	$54.78	$215.56	$23.27	$37.10	$930.25
64.45%	5.88%	23.18%	2.50%	3.99%	100%

Included in the amount for salaries are the salaries of the Field Supervisor for one month, and the project leader and assistant.

Under expenses are listed the personal expenses of the reconnaissance leader, including transportation to official headquarters from the field and transportation for the crew while working outlying sections from camp.

Subsistence has been charged at the rate of $.46 per meal as the computed cost of all meals at the Blister Rust Camp for the season. Included in this amount is the cost of a number of meals for visitors prorated to the reconnaissance project.

Overhead is the amount charged to the reconnaissance project for putting up, making and maintenance of camp on a prorated basis. Equipment has been charged to the project on the basis of 1/3 the value of that equipment used.

Ecology

Table No. V-A.

Salaries	Expenses	Subsistence	Total
$53.25	$59.62	$17.94	$130.81
40.71%	44.81%	14.48%	100%

Mr. A. Grasovsky, an Agent with this Office, made studies on a sample plot of the Forest Service, near Pinecrest, in relation to Ribes growth. His salary together with his assistants' salaries is included in that item. His personal expenses and transportation to and from his official headquarters together with the ecological trips taken while at the Blister Rust Camp are included in the amount under expenses.

Under subsistence is included the cost of his meals and of his assistant's while performing this work.

Overhead and equipment charges were carried by the reconnaissance project.

$$\frac{\text{Combined reconnaissance and ecology costs} - \$1061.06}{\text{Acres reconnaissanced} \quad 9440} = \$.112 \text{ Per Acre.}$$

$$\frac{\text{Reconnaissance costs} - \$930.25}{\text{Acres reconnaissanced} \quad 9440} = \$.098 \text{ Per Acre.}$$

In arriving at these costs unusual conditions have prevailed. Of the field season only about five weeks were spent in actual work by a two-man crew. The time of the reconnaissance leader, previous to the first of August was spent in eradication, scouting and reconnaissance studies.

For the foregoing reason, the following costs have been worked out on a monthly basis of 26 working days from the above data under the assumption that they would be indicative of usual working conditions:

Table No. VI.

	Expenses			Overhead	
Salaries	Personal	Car	Subsistence	Equipment	Total
$225.40	$15.67	$21.84	$46.00	$25.87	$334.78
67.3%	4.7%	6.5%	13.7%	7.8%	100%

A two-man crew can reconnaissance 320 acres per day, making a monthly acreage, assuming 24 days in the field and two in the office or in moving, of 7680 acres.

$$\frac{\text{Reconnaissance cost} - \$334.78}{\text{Acres reconnaissanced} \quad 7680} = \$.043 \text{ Per Acre.}$$

$$\frac{\text{Reconnaissance cost} - \$334.78}{\text{Total man days} \quad 60} = \$5.58 \text{ per man day.}$$

The salaries of leader and assistant make up the salary amount.

Personal expense are those of the leader including transportation to and from official headquarters.

Car expenses are figured on the basis of 12 miles per day at 7¢ per mile in a personally owned automobile - to and from field headquarters.

Subsistence is figured at 46¢ per meal for three meals per day per man.

Overhead and equipment charges are a proportional amount of that sum charged to the project for the entire season.

Reconnaissance work in California should be pushed ahead during the next two or three years, particularly that part of reconnaissance relative to the accumulation of available timber data. This data can probably be secured at the various Forest Service offices of each National Forest. If necessary such information should be augmented by field work.

The system followed in reconnaissance work this season was of too intensive a nature to be practical for a large acreage. A more rapid method of covering an area should be worked out and then applied as extensively as possible during each field season.

As early as the first of August, on dry sites, leaves of Grossularia roezli began to turn brown. By the first of September few leaves were left on the plants. This meant a lowered visibility, since other of the forest flora are similar in appearance at this period to G. roezli, which consequently reduced the accuracy of the Ribes data obtained.

For this reason, it would seem advisable to move the field season ahead in order to take advantage of the higher visibility of Ribes before they begin to lose their leaves.

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Personal expense are those of the leader including transportation to and from official headquarters.

Car expenses are figured on the basis of 12 miles per day at 7¢ per mile in a personally owned automobile -- to and from field headquarters.

Subsistence is figured at 45¢ per meal for three meals per day per man.

Overhead and equipment charges are a proportional amount of that sum charged to the project for the entire season.

Reconnaissance work in California should be pushed ahead during the next two or three years, particularly that part of reconnaissance relative to the accumulation of available timber data. This data can probably be secured at the various Forest Service offices of each National Forest. If necessary such information should be augmented by field work.

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For this reason, it would seem advisable to move the field season ahead in order to take advantage of the higher visibility of Ribes before they begin to lose their leaves.

EXPERIMENTAL RIBES ERADICATION - CALIFORNIA

by

Percy E. Melis,
Junior Forester.

This year marks the initial step in California in eradication work directed toward determining and solving the local control problems of this state. The immediate objects of the project were as follows:

(1) To ascertain, by actually performing the work, the conditions and problems affecting and influencing Ribes eradication.

(2) To develop, by trial, the type of organization and methods of work best adapted to local conditions.

(3) To determine and designate the different eradication types and record the specific problems of each.

(4) To obtain detailed cost data on the basis of acreage and eradication types for use in planning future eradication work.

(5) To develop in the locality a personnel familiar with the work, in preparation for a future need.

Upon the recommendation of Forest Service Officials of District #5, the Stanislaus National Forest was selected for the project, it being within the optimum range of sugar pine and having extensive areas of both uncut and cut-over lands. The requirements of an area, to be suitable for the experimental eradication work, were that it should contain both uncut and cut-over sugar pine types and should be representative of general conditions of timber, brush and Ribes.

With the cooperation of the Forest Service, a definite site was chosen by personal investigation in April of this year. This area is in T. 4 N., R. 18 E., Mt. Diablo Meridian, along the North Fork of Tuolumne River between Cold Spring and Pinecrest. It is drained by the above named stream and several of its small upper tributaries. The topography is in general quite regular, being on the lower western slopes of the Sierra Nevada Mountains and consisting of rolling hills cut by precipitous canyons. The soil is a mixture of old volcanic ash and decomposed granitic rock with many rock outcrops and surface boulders.

The area ranges from 5000 feet to slightly over 6000 feet in elevation. The meterological conditions are normal for that elevation and general locality. There are early and late snows but long summers with little or no precipitation.

EXPERIMENTAL RIBES ERADICATION - CALIFORNIA

by

Percy E. Melis,
Junior Forester.

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The area ranges from 5000 feet to slightly over 6000 feet in elevation. The meterological conditions are normal for that elevation and general locality. There are early and late snows but long summers with little or no precipitation.

The uncut lands were representative of general vegetative conditions, having an irregularly mixed coniferous timber stand with amounts of undergrowth and brush varying with the site. On southern exposures sugar pine and yellow pine were the principal timber species. Brush was not an important factor being in general limited to scattered clumps of chinquapin (Castanopsis sempervirens Dudley), manzanita (Arctostaphylos patula Greene) and Ceanothus (Ceanothus cordulatus Kell.). Coniferous reproduction was scarce or entirely lacking. The northern exposures were of the sugar pine-fir timber type and had much more brush and reproduction. The reproduction was rarely a serious difficulty factor in eradication; but in areas where fire, insects or disease had opened the timber stand, brush became increasingly heavy and in many places formed veritable thickets. On some areas the brush was sufficiently dense to have completely crowded out the Ribes while in other places the Ribes would occur scattered profusely through the Ceanothus, manzanita and wild cherry. Dense thickets of chinquapin were found to indicate an absence of Ribes. Along the streams willow and alder were found in mixture with the other brush species mentioned above. Annual plants were much more in evidence along the streams but did not consitute a serious problem in eradication.

The cut-over lands represented an area which had been cut and logged under Forest Service supervision about twenty years ago. The heavy cut made at that time had had a serious effect on the forest vegetation. In some places coniferous reproduction was found to be developing in a promising manner, but a large part of the area had been almost entirely taken over by brush, principally Ceanothus. Ribes, especially Grossularia roezli, were very dense in the cut-over area; including Ribes seedlings, the number per acre along streams was slightly over five hundred.

The two camp sites selected for the project were both located on the north fork of the Tuolumne River, one at the site of the abandoned Cold Spring mill and the second at Old Strawberry meadow. Both were accessible by auto, which greatly facilitated the transportation of men, equipment and supplies.

The organization for the project was patterned after the type of organization which had proved most efficient in the Idaho and Oregon work. A member of the permanent personnel of this Office was in charge of the work and responsible, therefore, directly to the Spokane Headquarters. The field work of the project was started on June 1st, with a one crew camp. This camp was gradually enlarged until July 1st at which time the organization for the project was standardized as follows:

Field Supervisor (In charge)		$166.00 per Month
Scout (Camp Boss)		$110.00 per Month
3 foremen (Each in charge of a crew)		$3.10 to $3.45 per Day
14 Crewmen (laborers)		$2.70 and $2.90 per Day
Cook		$125.00 per Month
Flunkey		75.00 per Month

The duties of cook and flunkey are evident from their designation. The crewmens' duties consisted of searching for and eradicating the Ribes bushes, under the directions of a foreman. Each foreman was responsible for the work of his crew of either four or five men. He kept them in proper alignment, usually in an echelon formation, regulated the spacing between men, recorded all bushes eradicated, and checked behind his men for bushes missed. The duties of scout and Camp Boss combined were, to assume charge of the work during absences of the Field Supervisor, delimit and mark working blocks and take direct charge of all scout eradication. The Field Supervisor was in direct charge of, and directly responsible for the project. In addition to handling all records and reports it was his duty to direct his efforts toward increasing the efficiency and amount of work in every way possible, and to represent the organization in all business transactions and in cooperative dealings with other organizations.

In connection and in cooperation with the Ribes eradication force the Methods Study organization performed intensive experimental work and made efficiency checks on all of the areas eradicated, and a reconnaissance crew made an intensive survey of lands adjacent to the area eradicated. Reports on these projects should be studied with this report in order to obtain a complete picture of the California operation.

The equipment for the project was supplied from headquarters at Spokane, Wash., and later supplemented by local purchase for immediate needs. Commissary supplies were all purchased locally at Sonora, California. Staple groceries were bought under bid and all other requirements purchased at locally prevailing rates. Transportation needs were provided for as the occasion demanded. Some freight was hauled with Forest Service truck, some by local transportation agencies and some by personally owned auto operated at seven cents per mile.

The area to be eradicated was divided into blocks or working units representing insofar as practicable, homogeneous working conditions. These blocks were later segregated on the basis of timber conditions and exposure into eradication types. The stream types consisted of strips along watercourses, varying in width with the topography, where the increased moisture supply had enhanced the growth of brush and annual plants. The brush type consisted of areas where the timber stand had been opened by insects, fire or other cause and brush had come in so thickly as to be the principal factor in eradication. The types designated by exposure were located as the name indicates. Thicket type consisted of areas of exceptionally dense brush; and mixed type consisted of areas which, as a part of a methods study experiment, had not been segregated into homogeneous blocks. The different types were each worked and recorded separately for purposes of comparison and statistical analysis

Field Supervisor (In charge)		$165.00 per Month
Scout (Camp Boss)		$110.00 per Month
3 foremen (Each in charge of a crew)		$3.10 to $3.45 per Day
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The types were given the following descriptive names so as to require the minimum of explanatory detail.

Cut over (20 yrs.) Stream: Strips from one to several chains in width along the water courses in the cut-over area. Brush and moisture loving annuals together form a complete ground cover which, with the large number of Ribes, makes working conditions very difficult.

Average Ribes per acre on area worked - 504.

Cut over (20 yrs.) Northern Exposure: The shadier slopes of the cut-over lands. These areas are characterized by large amounts of evergreen shrubs through which the Ribes are generally scattered.

Average Ribes per acre on area worked - 151.

Cut over (20 yrs.) Southern Exposure: The dry, hot slopes of the cut-over lands. Brush is confined to moderate amounts of Ceanothus and manzanita with some Ribes.

Average Ribes per acre on area worked - 37.

Mature Timber, Stream: Strips along steams in the mature timber representing openings in the stand, where, on account of the increased moisture available, brush and Ribes are generally prevalent.

Average Ribes per acre on area worked - 109.

Mature Timber, Northern Exposure: The shadier, moister slopes in the mature timber stands. Brush and Ribes in moderate amounts were found generally through the type.

Average Ribes per acre on area worked - 29.

Mature Timber, Southern Exposure: The sunny slopes of the mature timber lands. Usually an open timber stand with very little brush and few Ribes.

Average Ribes per acre on area worked - 7.

Mature Timber, Flat: Areas of poorly defined drainage having considerable brush but few Ribes.

Average Ribes per acre on area worked - 4.

Brush (Northern Exposure): Areas on which the brush was so thick as to made all other eradication factors of negligible importance. (It so happened that all of this type occurred on northern exposure).

Average Ribes per acre on area worked - 78.

Thicket Type: Areas where brush was so dense as to practically eliminate the Ribes and thus obviate the necessity of crew work.

Average Ribes per acre on area worked - 1/2.

Mixed Type: Areas not segregated, in working, into their proper type classification.

Average Ribes per acre on area worked - 17.

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In each of the cut over types, the brush was much denser and Ribes thicker than in the similarly located mature timber areas. Ceanothus was the principal species of brush, with some manzanita, and along streams willow and alder. The brush was generally much more dense on the northern exposures than on the southern. Coniferous reproduction was generally present but was not of major importance in either Ribes occurrence or eradication.

In the uncut areas the coniferous reproduction was of practically no importance in regard to Ribes. The brush in order of occurrence was Ceanothus, chinquapin, manzanita, wild cherry, willow and alder. It was densest in thicket type and next in brush type, with stream, northern exposure, flat, and southern exposure following, in the order given.

The vegetation of the thicket type was a dense chaparral consisting almost exclusively of Ceanothus, chinquapin, manzanita and wild cherry. The only Ribes in this type were along the edges; these were pulled by the scouts as they delimited the area.

The flat and southern exposure types in mature timber had so few Ribes that they were also worked by scouts; i. e., by two or three men stripping the area at wide intervals. In working by this method, efficiency or thoroughness was slightly sacrificed to attain a greater speed. The objective in this method of work was to find all of the Ribes concentrations and large bushed without taking time to insure the highest feasible percentage of efficiency on the smaller bushes. Ribes were found around heads of draws, on rock outcrops and occasionally scattered with no apparent reason for their choice of location. The southern exposures had so little brush as to be almost parklike in appearance; the ground cover being principally a low, fernlike growth (Chamaebatia foliolosa Benth), called bear clover or mountain misery. The flat areas contained considerable Ceanothus scattered through the timber, but not very much other brush.

The amount of Ribes and brush in the other types made it necessary to work them, for the most part, in regular echelon crew formation; the distance between men and the rate of progress being varied to suit local conditions.

In all types except Mature Timber - Stream, Grossularia roezli was the principal Ribes species and in this type it was a close second to Ribes nevadense, which was second in all other types.

In order of occurrence the species of Ribes found over the entire area were Grossularia roezli, R. nevadense, R. Hallii and R. cereum. These species, as growing in this locality, were all deep rooted, tenacious plants, and all mature plants required the use of a grubbing tool for their eradication. The dryness of the ground and the large amount of surface boulders and rock outcrops made the actual extraction of the Ribes plant a more difficult matter than it had been found in other localities. Even the small plants were sometimes much easier to grub out than to pull by hand. G. roezli is by far the most important species of the locality;

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over 80% of the total bushes found were of this species.

Early in the season the visibility of the Ribes seemed to be quite high but as the season became drier the Ribes became less conspicuous. Toward the end of the season the Ribes leaves began to fall and the visibility consequently became quite low. Ribes were so closely associated with Ceanothus that in some areas, particularly cut over types, it was found necessary to raise up the branches of the Ceanothus bushes in searching for Ribes. Many were found in this location, G. roezli seedlings were particularly abundant in the shelter of other vegetation.

There were two factors, irrespective of the Ribes conditions, which influenced the work to a considerable degree. The prevelance of rattlesnakes, in the area worked, kept the men constantly on the lookout for them. This reduced their ability to concentrate their attention on searching for Ribes. The other factor was the scarcity of drinking water in the hills. In working many of the blocks the men had to carry their day's supply of water from camp. This is not a particularly serious matter but is considered worthy of mention.

The following tabular statement, based on eradication types gives a numerical picture of the season's accomplishment.

Table No. I.

Summary of Season's Accomplishment

Eradication Type	Acres	Ribes per Acre	Total Ribes	Ribes by Species: G. roezli	R. nevadense	R. cereum	R. hallii	Time Man Days	Acres per Man Day	Percentage of Total: Acreage	Working Time	Ribes
Cut Over (20 yrs.) Stream	87	504	43817	39801	4014	2	0	120.5	0.72	2.8	9.9	24.0
Cut Over (20 yrs.) Northern Exposure	144	151	21704	21389	310	5	0	92	1.56	4.6	7.6	12.0
Cut Over (2o yrs.) Southern Exposure	346	37	12886	12723	161	2	0	121	2.86	11.0	9.9	7.0
Mature Timber Stream	301	109	32789	16230	16540	19	0	239.5	1.26	9.6	19.7	18.0
Mature Timber Northern Exposure	793	29	23294	20534	2749	11	0	211.5	3.70	25.3	17.3	12.5
Mature Timber Southern Exposure	430	7	3034	3026	3	5	0	23	18.70	13.7	1.9	2.0
Mature Timber Flat	225	4	896	858	38	0	0	11	20.45	7.2	0.9	0.5
Brush (Northern Exposure)	548	78	42498	36681	5425	77	315	373	1.47	17.5	30.6	23.0
Thicket	125	1/2	65	62	3	0	0	2	62.50	4.0	0.2	0.0
Mixed	135	17	2313	2146	166	1	0	2.5	5.40	4.3	2.0	1.0
Averages & Totals	3134	59	183296	153450	29,409	122	315	1218.5	2.57	100	100	100

Table No. II. shows, in more detail, the progress of the work. In this table the block or actual working-unit is used as a basis for all of the computations. In this way the variations in cost per acre even within an eradication type are presented. This variation results from differences in brush density as well as differences in the number of Ribes per acre.

Table No. II

Progress of Eradication

Block Number	Inclusive Dates of Work	Eradication Type	Acres	Total Ribes	Ribes per Acre	Cost per Acre
1	6/4 - 19	Cut over - Stream	62	31542	509	$7.26
2	6/16 - 30	Cut over-Nor. Exp.	144	21704	151	$3.65
3	7/7 - 15	Cut over-So. Exp.	66	2838	43	$3.45
4	6/28 - 7/7	Cut over - Stream	25	12275	491	$9.50
5	6/21 - 26	Cut over -So. Exp.	110	3606	33	$1.67
6	6/23 - 25	Cut over-So. Exp.	134	269	2	$0.21
7	7/1 - 10	Cut over-So. Exp.	36	6173	172	$7.12
8	7/15- 7/26	Mature - Nor. Exp.	146	3811	26	$2.04
9	7/6 - 10	Mature - So. Exp.	95	95	1	$0.18
10	7/2 - 7	Mature - Stream	20	2364	118	$6.38
11	6/22 - 7/15	Mixed	135	2313	17	$1.05
12	7/7 - 13	Mature - Stream	21	2777	132	$4.56
13	7/9 - 26	Mature - Stream	45	6939	154	$7.60
14	7/12 - 21	Mature -Nor. Exp.	100	4371	44	$2.53
15	7/12 - 17	Mature -So. Exp.	100	235	2	$0.17
16	7/17 - 8/5	Brush	130	6767	52	$2.85
17	7/26 - 8/2	Mature - Stream	30	5362	179	$7.12
18	7/24	Thicket	125	65	1/2	$0.09
19	7/29	Mature - So. Exp.	120	278	2	$0.14
20	7/26 - 8/7	Mature - Stream	50	4732	95	$4.75
21	8/6 - 10	Mature - Stream	15	4031	269	$5.70
22	7/28 - 8/25	Brush	168	9296	55	$3.35
23	7/17 - 8/13	Brush	75	5043	67	$4.56
24	8/24 - 9/9	Brush	175	21392	122	$4.75
25	8/10 - 16	Mature - Stream	45	4685	104	$3.26
26	8/13 - 30	Mature - Nor. Exp.	292	8771	30	$1.63
27	8/16 - 19	Mature - Stream	40	1095	27	$1.90
28	9/2 - 9/3	Mature - Nor. Exp.	65	1782	27	$0.63
29	8/19 - 23	Mature - So. Exp.	55	2418	44	$1.42
30	9/6 - 7	Mature - Stream	35	804	23	$1.06
31	9/7 - 11	Mature - Nor. Exp.	135	2598	19	$0.71
32	7/28 - 8/20	Mature - Flat	225	896	4	$0.28
33	9/1	Mature - So. Exp.	60	8	0 +	$0.10
34	9/11 - 12	Mature - Nor. Exp.	55	1961	36	$1.04
	Totals and Averages		3134	183296	59	$2.22

Cost Analysis

For purposes of analysis the expense of the eradication project herein discussed has been segregated into its component parts and classified as follows:

Supervision: salary and expenses of field supervisor for time spent in directing the work.

Labor: the salaries paid to temporary men employed in the field work.

Equipment: one third the purchase cost of all equipment used.

Meals: the cost of food, transportation of same, and salaries paid to cook and flunkey.

Overhead: (all other costs) including transportation of men and equipment and the cost of such miscellaneous camp necessities as lumber, kerosene, etc.

These last two divisions are itemized as follows:

Meals		Overhead	
Food.	$2,140.12	Transportation of men	$ 80.00
Transportation of supplies. .	166.58	Transportation of equipment. .	80.00
Salary (cook and flunkey). .	680.00	Misc. camp supplies	137.86
Total meal cost .	$2,986.70	Total	$297.86

Since the men engaged in reconnaissance, methods study and pre-eradication work were subsisted at the eradication camp the charges for meals and overhead were prorated on the basis of the number of meals served to each project. The total meals chargeable to each project and the corresponding distribution of costs are as follows:

	Number of Meals	Distribution of Cost: Meals	Overhead
Eradication	5,327	$2,443.70	$243.64
Methods.	589	270.00	26.93
Reconnaissance	509	233.00	23.27
Pre-eradication	88	40.00	4.02
Totals	6,513	$2,986.70	$297.86

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Actual eradication costs only.

The following list shows the itemized amounts and the total cost of the eradication project:

	Amount	Percentage
Supervision	$ 477.24	7.0
Labor	3689.15	53.0
Equipment	91.30	1.3
Meals	2443.70	35.2
Overhead	243.64	3.5
Total cost of Project	$6945.03	100%

The cost for each eradication type has been computed on the basis of the percentage of total working time charged to each type. The following table shows the detailed cost figures on each eradication type:

Table No. III

Eradication Type	Acres	Cost	Cost per acre	Ribes per acre	Cost per Ribes Bush	Percentages of Total		
						Acres	Cost	Ribes
Cut Over (20 years) Stream	87	$686.80	$7.89	504	$0.015	2.8	9.9	24
Cut Over (20 years) Northern Exposure	144	524.37	3.64	151	0.025	4.6	7.6	12
Cut Over (20 years) Southern Exposure	346	689.65	1.99	37	0.054	11.0	9.9	7
Mature Timber Stream	301	1365.07	4.54	109	0.042	9.6	19.7	18
Mature Timber Northern Exposure	793	1205.47	1.52	29	0.052	25.3	17.3	12½
Mature Timber Southern Exposure	430	131.10	0.30	7	0.043	13.7	1.9	2
Mature Timber Flat	225	62.70	0.28	4	0.070	7.2	0.9	1/2
Brush (Northern Exposure)	548	2125.97	3.88	78	0.050	17.5	30.6	23
Thicket	125	11.40	0.09	1/2	0.175	4.0	0.2	0
Mixed	135	142.50	1.05	17	0.062	4.3	2.0	1
Totals and Averages	3134	$6945.03	$2.22	59	$0.038	100.0	100.0	100

Table No. III. clearly shows the variation in cost per acre and in cost per bush in the different eradication types. As would normally be expected, in types having a dense Ribes population the acreage cost is high and the cost per bush is low. The reverse of this condition has a tendency to reduce the cost per acre and increase the cost per bush. Variations from a direct ratio in this regard are explained by the differences in working conditions. In types having the Ribes occurring in dense brush the cost per bush and per acre are both higher than would be expected in considering only the number of Ribes. And in park-like areas where the Ribes were generally found in the open the cost is correspondingly lower.

The map of the eradication area which accompanies this report shows in detail the location in respect to each other of the different blocks and types.

PRE-ERADICATION FOR 1927 - CALIFORNIA

by
P. E. Melis, Junior Forester,
and
R. A. Pendleton, Agent.

* *

During the field season of 1926 an area was selected on which to continue, in 1927, the Experimental Ribes Eradication Project in California. This area joins the 1926 area on the north and extends north and east in the drainages of the south and middle forks of the Stanislaus River. The area chosen contains approximately 6000 acres and contains both mature and cut-over sugar pine timber types. It is located in T. 4 N., R. 18 E., Mt. Diablo Meridian.

In preparation for the field season of 1927 it was decided to do some preliminary work on the eradication area. The purpose of this advance work was to facilitate the work of next season by making available for field use all the information on the area necessary for planning and starting the operation. This procedure will enable the eradication forces to move into the area and commence efficient work with no loss of time due to unfamiliarity with the problem at hand.

The preliminary work consisted of segregating the area into eradication types and working-units or blocks. All of these blocks were definitely marked so as to be readily located in the field next year. In addition, a map of the area was built up to show the location of the blocks in relation to the roads, trails, ridges and general drainage system. Data were recorded on each block giving the type, approximate area, general working conditions and relative Ribes population.

In performing this work the data supplied by the control reconnaissance of the area was first carefully studied and interpreted by eradication men. These men then proceeded to lay out the blocks and types on the ground, obtaining what supplementary information was required as they needed it. This supplementary information consisted largely of tracing out and allocating lines of demarkation between areas representing appreciably different working conditions or having distinct differences in Ribes population.

The total cost of this work was $137.49 and is itemized as follows:

Salaries..............................	$ 76.60
Meals and camp upkeep..................	44.02
Transportation to and from work by auto.	16.87
Total..........	$137.49

On the basis of 6000 acres, which is believed to be a conservative estimate of the area blocked out, the cost per acre is $0.023.

The field notes and map by R. A. Pendleton, Agent, are herewith submitted as being the major part of this report.

* * * * *

Field notes on Ribes eradication area comtemplated for 1927, by R. A. Pendleton, Agent. Camp located on South Fork Stanislaus below Strawberry Inn.

Block No. 1

Bounded on the west by west line Section 30 from Sonora-Pinecrest road to Stanislaus River. Bounded on northwest by river, up to dam site. Bounded on northeast by relatively straight line extending from dam up ridge to Stinchfield place. Bounded on southeast by road. Containing 190 acres more or less 20 year cut over northern exposure. Ribes rather numerous.

Block No. 2

Stream type area lying within Block No. 1, containing 20 acres more or less comprising all the stream type in the principal stream in Block No. 1.

Block No. 3

Lying adjacent to Block No. 1 adjoining Block No. 1 on the northeast, mature timber, sugar pine fir. Containing 180 acres more or less. It lies between the road and Stanislaus River, bounded on the east by the west line of Section 19 from river to road, on the southwest by Block No. 1. Ribes sufficient to require crew work.

Block No. 4

Block No. 4 is an extension of the same area similar to Block No. 3 but less rugged. It comprises all the remaining area between the road and the river from Block No. 3 up to the point where the road crosses the river near Strawberry Inn. Contains 170 acres more or less. Working conditions are not very difficult on Blocks No. 1, 2, 3 and 4.

Block No. 5

This block lies north of and adjoining on the southeast the Stanislaus River in Sections 19 and 30. West boundary is Section line, South is river, north is the main ridge which divides drainage of south

On the basis of 6000 acres, which is believed to be a conservative estimate of the area blocked out, the cost per acre is $0.023.

The field notes and map by R. A. Pendleton, Agent, are herewith submitted as being the major part of this report.

* * * * *

Field notes on Ribes eradication area contemplated for 1927, by R. A. Pendleton, Agent. Camp located on South Fork Stanislaus below Strawberry Inn.

Block No. 1

Bounded on the west by west line Section 30 from Sonora-Pinecrest road to Stanislaus River. Bounded on northwest by river, up to dam site. Bounded on northeast by relatively straight line extending from dam up ridge to Stinchfield place. Bounded on southeast by road. Containing 190 acres more or less 20 year cut over northern exposure. Ribes rather numerous.

Block No. 2

Stream type area lying within Block No. 1, containing 20 acres more or less comprising all the stream type in the principal stream in Block No. 1.

Block No. 3

Lying adjacent to Block No. 1 adjoining Block No. 1 on the northeast, mature timber, sugar pine fir. Containing 180 acres more or less. It lies between the road and Stanislaus River, bounded on the east by the west line of Section 19 from river to road, on the southwest by Block No. 1. Ribes sufficient to require crew work.

Block No. 4

Block No. 4 is an extension of the same area similar to Block No. 3 but less rugged. It comprises all the remaining area between the road and the river from Block No. 3 up to the point where the road crosses the river near Strawberry Inn. Contains 170 acres more or less. Working conditions are not very difficult on Blocks No. 1, 2, 3 and 4.

Block No. 5

This block lies north of and adjoining on the southeast the Stanislaus River in Sections 19 and 30. West boundary is Section line, South is river, north is the main ridge which divides drainage of south

and middle forks of Stanislaus. East line follows a creek, starting at the river about 30 chains west of 19|20 and following creek about north 40 degrees west to top of ridge. 30|29

It is largely 20 year cut over area southern exposure containing 160 acres more or less. Some brush and some Ribes .

Block No. 6

Block No. 6 is stream type, cut over, about 30 years, it is the area of a small stream flowing into the Stanislaus from the north about 7 or 8 chains above the dam. The stream widens out into a narrow flat so that the area contains about 20 acres more or less.

Block No. 7

Block No. 7 is a large block of sugar pine-yellow pine, type. Drainage into the Stanislaus from the north. Although small gullies break up the slope in many places, there are no streams in it of sufficient size or containing sufficient Ribes to warrant a stream type. There are Ribes in these gullies but otherwise the area is comparatively free.

Area is about 290 acres, bounded on the south by Stanislaus, west by Block No. 5, north by top of ridge, and on the east by section line between 19 and 20.

Block No. 8

This block is a continuation of Block No. 7 of the same general type. It extends from Block No. 7 up to the new cut over area. The upper limits are marked by a snag stump at the side of the road being blazed. From this stump a line due west to the top of the ridge connects with a conspicuous tree. This is a large block (about 460 acres) which can be largely worked by scouts.

Block No. 9

This block is all cut over area of about 4 years old. The *Grossularia roezli* have started well and are rather numerous over the entire area. The block is rather large (about 380 acres) but no natural drainage courses serve to divide it. It is all north exposure, draining into the Middle Fork. The drainage is mostly northwest but a small portion on the west side drains west, although this does not change the type materially. Along the upper edge the brush is rather dense, but the major portion of the area is fairly open and rather steep.

It is bounded on the southeast by the main divide ridge, on the west by township line, on northwest by main line of Pickering Lumber Company railroad and east by section line between 18 and 17.

and middle forks of Stanislaus. East line follows a creek, starting at the river about 30 chains west of 19|20 and following creek about north 40 degrees west to top of ridge. 30|29

It is largely 20 year cut over area southern exposure containing 150 acres more or less. Some brush and some Ribes.

Block No. 6

Block No. 6 is stream type, cut over, about 30 years, it is the area of a small stream flowing into the Stanislaus from the north about 7 or 8 chains above the dam. The stream widens out into a narrow flat so that the area contains about 20 acres more or less.

Block No. 7

Block No. 7 is a large block of sugar pine-yellow pine, type. Drainage into the Stanislaus from the north. Although small gullies break up the slope in many places, there are no streams in it of sufficient size or containing sufficient Ribes to warrant a stream type. There are Ribes in these gullies but otherwise the area is comparatively free.

Area is about 290 acres, bounded on the south by Stanislaus, west by Block No. 5, north by top of ridge, and on the east by section line between 19 and 20.

Block No. 8

This block is a continuation of Block No. 7 of the same general type. It extends from Block No. 7 up to the new cut over area. The upper limits are marked by a snag stump at the side of the road being blazed. From this stump a line due west to the top of the ridge connects with a conspicuous tree. This is a large block (about 460 acres) which can be largely worked by scouts.

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It is bounded on the southeast by the main divide ridge, on the west by township line, on northwest by main line of Pickering Lumber Company railroad and east by section line between 18 and 17.

Block No. 10

This block is of the same general type as Block No. 9, North exposure, cut over 4 years, general northwest drainage and not cut up to any extent by streams, can readily be worked in one block of about 210 acres.

It is bounded on the southeast by the main divide ridge, between the two forks of Stanislaus, on west by Block No. 9, and northwest by railroad track, on north by section line between 17 and 8.

In addition to these blocks enumerated there is a stream type to be worked all along the river. This will be a rather narrow strip but will amount to several acres.

Leland Meadows, Camp Site

Block No. 11

This block is the most rough and rugged of all the area blocked, it lies in Section 2 and extends as far east as it is practicable to work the area, about 250 acres. Area is largely a high, open, rocky plateau although a portion is north exposure, slightly more moist, type. A considerable portion of the area can be scouted, but a portion around the east edge has dense growth of Ribes cereum and G. roezli. The boundary line runs about as follows: beginning 5 chains north of section corner $\frac{3 \mid 2}{10 \mid 11}$ follow ridge about due east to trail, then along trail north 80 degrees east to a point about 60 chains east of section line between sections 3 and 2 to conspicuous tree, then follow ridge north 10 degrees east about 25 chains, then northwest to 1/4 corner between sections 2 and 35, then along section line to section corner $\frac{34 \mid 35}{3 \mid 2}$, then due south to starting point. Mature timber type.

Block No. 12

This block lies to the south of Block No. 11 partly in section 2 and partly in section 11. It is of rather mixed type, on account of two different slopes. In eradication it might be advisable to cut the block into two, although this could not be readily ascertained until actual field work had been begun. Altogether there are about 200 acres bounded on west by section line between 11 and 10 from southwest corner of 11 to the next ridge south, thence northeast up this ridge to the southeast corner of 11 on the trail, thence on the south boundary of 11 to starting point. A portion of the eastern edge is very steep and brushy with dense Ribes growth. The area is largely either new cut or marked for cut.

Block No. 10

This block is of the same general type as Block No. 9, North exposure, cut over 4 years, general northwest drainage and not cut up to any extent by streams, can readily be worked in one block of about 210 acres.

It is bounded on the southeast by the main divide ridge, between the two forks of Stanislaus, on west by Block No. 9, and northwest by railroad track, on north by section line between 17 and 8.

In addition to these blocks enumerated there is a stream type to be worked all along the river. This will be a rather narrow strip but will amount to several acres.

Leland Meadows, Camp Site

Block No. 11

This block is the most rough and rugged of all the area blocked, it lies in Section 2 and extends as far east as it is practicable to work the area, about 250 acres. Area is largely a high, open, rocky plateau although a portion is north exposure, slightly more moist, type. A considerable portion of the area can be scouted, but a portion around the east edge has dense growth of *Ribes cereum* and *G. roezli*. The boundary line runs about as follows: beginning 5 chains north of section corner 3|2 / 10|11 follow ridge about due east to trail, then along trail north 80 degrees east to a point about 60 chains east of section line between sections 3 and 2 to conspicuous tree, then follow ridge north 10 degrees east about 25 chains, then northwest to 1/4 corner between sections 2 and 35, then along section line to section corner 34|35 / 3|2, then due south to starting point. Mature timber type.

Block No. 12

This block lies to the south of Block No. 11 partly in section 2 and partly in section 11. It is of rather mixed type, on account of two different slopes. In eradication it might be advisable to cut the block into two, although this could not be readily ascertained until actual field work had been begun. Altogether there is about 200 acres bounded on west by section line between 11 and 10 from southwest corner of 11 to the next ridge south, thence northeast up this ridge to the southeast corner of 11 on the trail, thence on the south boundary of 11 to starting point. A portion of the eastern edge is very steep and brushy with dense Ribes growth. The area is largely either new cut or marked for cut.

Block No. 13

This is a small block of stream type occasioned by the numerous currants, R. nevadense, in the small streams that feed to Leland Meadow. It comprises all the stream type in these branches, that furnish water for Leland Meadow Camp Site, which lie wholly in section 2, approximately 10 acres.

Block No. 14

This block can be best classifed as a wet meadow type, comprising the whole of Leland Meadow and enough of the adjoining area to take in all the moist type. Total of about 80 acres although a large portion of this is devoid of timber. Ribes rather large and numerous around the edge.

Block No. 15

This is a small block of about 20 acres of sugar pine-fir type which takes in the slope between Leland Meadow and the top of the ridge to the southwest and west. Ribes, average. Timber, mature.

Block No. 16

This block is stream type which takes in the whole of the stream which drains area of Block No. 12. It lies partly in section 10 and partly in section 11. It lies in new cut over area. Not many Ribes. Probably 30-40 acres.

Block No. 17

Block No. 17 is a large area of stream type along Herring Creek, extending from the intersection of this creek with the south line of section 10 upstream as far as practicable to work, which will probably be to the east line of section 11. It lies largely in new cut or marked for cut area.

Block No. 18

This block is southern exposure sugar pine-yellow pine type adjoining Block No. 12 on the south. It is new cut or marked for cut area. Drainage into Herring Creek. Bounded on northwest by Block No. 12, on west by section line between 11 and 10, from southwest corner of Block No. 12 to Herring Creek, on south by Herring Creek and extending east as far as it is practicable to work the area, which will be approximately 60 chains east of the west boundary. Total of about 120 acres.

Block No. 19

This is a very large unbroken block of southern exposure sugar pine-yellow pine, new cut area. It drains into Herring Creek and lies partly in section 10 and partly in section 15. There is no occasion for dividing the block unless for convenience of working. It contains a total

Block No. 13

This is a small block of stream type occasioned by the numerous currents, E. nevadense, in the small streams that feed to Leland Meadow. It comprises all the stream type in these branches, that furnish water for Leland Meadow Camp Site, which lie wholly in section 2, approximately 10 acres.

Block No. 14

This block can be best classified as a wet meadow type, comprising the whole of Leland Meadow and enough of the adjoining area to take in all the moist type. Total of about 80 acres although a large portion of this is devoid of timber. Ribes rather large and numerous around the edge.

Block No. 15

This is a small block of about 40 acres of sugar pine-fir type which takes in the slope between Leland Meadow and the top of the ridge to the southwest and west. Ribes, average. Timber, mature.

Block No. 16

This block is stream type which takes in the whole of the stream which drains area of Block No. 14. It lies partly in section 10 and partly in section 11. It lies in new cut over area. Not many Ribes. Probably 30-40 acres.

Block No. 17

Block No. 17 is a large area of stream type along Herring Creek, extending from the intersection of this creek with the south line of section 10 upstream as far as practicable to work, which will probably be to the east line of section 11. It lies largely in new cut or marked for cut area.

Block No. 18

This block is southern exposure sugar pine-yellow pine type adjoining Block No. 12 on the south. It is new cut or marked for cut area. Drainage into Herring Creek. Bounded on northwest by Block No. 12, on west by section line between 11 and 10, from southwest corner of Block No. 12 to Herring Creek, on south by Herring Creek and extending east as far as it is practicable to work the area, which will be approximately 60 chains east of the west boundary. Total of about 160 acres.

Block No. 19

This is a very large unbroken block of southern exposure sugar pine-yellow pine, new cut area. It drains into Herring Creek and lies partly in section 10 and partly in section 15. There is no decision for dividing the block unless for convenience of working. It contains a total

of about 475 acres. It is bounded as follows: beginning at the southwest corner of Block No. 11 thence follow the ridge which forms the main divide between the south and middle forks, in a general southwesterly direction, to the intersection of this ridge with the west line of section 10, which point is about 22 chains north of section corner $\frac{9 | 10}{16 | 15}$. Thence due south on section line to Stanislaus River slightly below the mouth of Herring Creek, thence up stream and up Herring Creek to its intersection with the south line of section 10, thence east along the south line of section 10 to section corner $\frac{10 | 11}{15 | 14}$, thence due north to the starting point. Due to the recent logging in the area, it is difficult to estimate the Ribes, but the stand is not heavy and working conditions are not bad.

Block No. 20

This area is fairly new cut, probably about 2 years old. It is of somewhat broken character, mostly western exposure of sugar pine-yellow pine type. It contains about 340 acres, Ribes conditions are not bad but Ribes are fairly numerous. The block is bounded on the east by Block No. 15, on the northwest by Leland Meadow road from the meadow to the point where it crosses the north line of section 10, thence west to section corner $\frac{4 | 3}{9 | 10}$, thence due south to the top of the ridge (northwest corner of Block No. 19) and bounded on the south by Block No. 19. This block could be readily cut into smaller blocks by the section line, road or railroad, if working conditions made it advisable.

Block No. 21

This is an area similar to Block No. 20 of general western and northwestern exposure lying to the north of Block No. 20 in section 3. Ribes conditions, average. It is bounded on the south and east by Block No. 20, on the northeast by Leland Creek, to its intersection with an extension of the west line of section 3, about 20 chains north of section corner $\frac{\quad|\quad}{4 | 3}$, and on the west by the west line of section 3. Upper edge very brushy and many Ribes. 270 acres.

Block No. 22

This is an area of stream type of about 20 acres which takes in the remaining portion of Herring Creek from the mouth to Block No. 17. New cut area. Considerable numbers of large R. nevadense.

Block No. 23

This is a block of stream type of about 20 acres which takes in Leland Creek between Leland Meadow and the Bridgeport Highway.

of about 475 acres. It is bounded as follows; beginning at the southwest corner of Block No. 11 thence follow the ridge which forms the main divide between the south and middle forks, in a general southwesterly direction, to the intersection of this ridge with the west line of section 10, which point is about 22 chains north of section corner $\frac{9|10}{16|15}$. Thence due south on section line to Stanislaus River slightly below the mouth of Herring Creek, thence up stream and up Herring Creek to its intersection with the south line of section 10, thence east along the south line of section 16 to section corner $\frac{10|11}{15|14}$, thence due north to the starting point. Due to the recent logging in the area, it is difficult to estimate the Ribes, but the stand is not heavy and working conditions are not bad.

Block No. 20

This area is fairly new cut, probably about 2 years old. It is of somewhat broken character, mostly western exposure of sugar pine-yellow pine type. It contains about 240 acres, Ribes conditions are not bad but Ribes are fairly numerous. The block is bounded on the east by Block No. 15, on the northwest by Leland Meadow road from the meadow to the point where it crosses the north line of section 10, thence west to section corner $\frac{4|3}{9|10}$, thence due south to the top of the ridge (northwest corner of Block No. 19) and bounded on the south by Block No. 19. This block could be readily cut into smaller blocks by the section line, road or railroad, if working conditions made it advisable.

Block No. 21

This is an area similar to Block No. 20 of general western and northwestern exposure lying to the north of Block No. 20 in section 3. Ribes conditions, average. It is bounded on the south and east by Block No. 20, on the northeast by Leland Creek, to its intersection with an extension of the west line of section 3, about 20 chains north of section corner $\frac{\;|\;}{4|3}$, and on the west by the west line of section 3. Upper edge very brushy and many Ribes. 270 acres.

Block No. 22

This is an area of stream type of about 20 acres which takes in the remaining portion of Herring Creek from the mouth to Block No. 17. New cut area. Considerable numbers of large R. nevadense.

Block No. 23

This is a block of stream type of about 20 acres which takes in Leland Creek between Leland Meadow and the Bridgeport Highway.

Block No. 24

This is a small block of southern exposure lying between Leland Creek and the first ridge to north, and between Leland Meadow and Bridgeport road. Upper part is very brushy and has heavy stand of G. roezli. About 60 acres more or less.

Block No. 25

A stream type block. Comprising all of the stream type in Bumblebee Creek up stream from the main Bridgeport road. 8-10 acres.

Block No. 26

New cut over area of about 240 acres. Southern exposure which takes in all the area between the road from Strawberry Resort to Pickering's Camp, and the main ridge, which lies above Block No. 8.

There is one draw in this area that is heavily stocked with G. roezli, which are also more or less numerous near the ridge, but a portion of the block can be scouted.

Block No. 27

This is a small block of about 95 acres of new cut area which is largely hill top with some south exposure. This block takes in nearly all the building sites of Pickering Lumber Company. Bounded by main ridge on north, road on west and taking in all of the southeast part of section 9.

Block No. 28

This is a small block of about 90 acres, blocked out to take in Strawberry Resort. Southern exposure of mature timber which can be worked with a scout crew except for one or two small gullies. Bounded by road on west and north, Stanislaus on south, and, east line of section 17 on the east.

Block No. 29

A stream type block of 10 acres more or less in Bumblebee Creek down stream from Bridgeport road. This is blocked down to lower main line of Pickering Lumber Company but can be worked farther down if desirable.

Block No. 30

A stream type block of 15 acres taking a tributary of Bumblebee Creek from the south which empties in a little below the crossing of the main line of Pickering Lumber Company. Good pool, for swimming.

Block No. 31

A block of 4 year cut over, north exposure in the southwest corner of section 4, including all the area in section 4, south of Bumblebee Creek and east of the railroad (lower line). About 65 acres. Ribes rather numerous, excellent sugar pine.

Block No. 32

An area of north and west exposure which has been partly cut over but, as it lies along the road, has not been cut close. About 90 acres in northeast part of section 9. Bounded on the west by main road, on south by main ridge, and on east and north by section lines of section 9. Drinking water available from two streams.

Block No. 33

A large block of 4 year cut. North exposure 270 acres, cut across by Block No. 30. Ribes are rather numerous but there is very little brush. Bounded on north by Block No. 31, on east by Block No. 32 on the south by Block No. 26 and on the west by a ridge which runs from $\frac{5|4}{8|9}$, generally south 10 degrees east, to main ridge.

Block No. 34

This is a large block west exposure, 4 year cut over, of about 270 acres, uniform stuff. Good sugar pine. Fairly good working conditions with considerable numbers of Ribes. Bounded on east by east line of section 4, on north by north line of section 4, on west by lower main railroad of Pickering Lumber Company and on south by Bumblebee Creek. This block has in it the permanent Ribes study plot which should not be worked.

Block No. 35

A large block of south exposure new cut with few Ribes showing, which can probably be worked with scout crew. 430 acres. In section 16. Bounded on north by north line of section 16 on east by east line down to Herring Creek on south by Herring Creek and Stanislaus, on west by west line of section 16 up to road and on the northwest by main road. No streams of any size cutting the block. Some rather rocky area near upper end of block.

Block No. 36

A large area of about 350 acres of north exposure 4 year cut, in east half of section 8, and west edge of section 9, contains some brushy areas but mostly fair working conditions, good sugar pine type. Ribes distributed generally over the area, mostly _G. roezli._ Area cut by two

Block No. [illegible]

A block of 4 year cut over, north exposure in the southwest corner of section 4, including all the area in section 4, south of Bumblebee Creek and east of the railroad (logger line). About [illegible] acres. [illegible] rather numerous, excellent sugar pine.

Block No. [illegible]

An area of north and west exposure which has been partly cut over but, as it lies along the road, was not clean cut [illegible]. About [illegible] acres in northeast part of section 2. Bounded on the west by main road, on south by main ridge, and on east and north by section lines of section 2. Drinking water available from two streams.

Block No. [illegible]

A large block of 4 year cut. North exposure [illegible] acres, [illegible] across by Block No. [illegible]. [illegible] are rather numerous and there is very little brush. Bounded on north by Block No. [illegible], on east by Block No. [illegible] on the south by Block No. [illegible] and on the west by a ridge which runs from [illegible], generally south 10 degrees east, to main ridge.

Block No. 64

This is a large block east exposure, 4 year cut [illegible] of about 270 acres, uniform stuff. Good sugar pine. Fairly good working conditions with considerable numbers of [illegible]. Bounded on east by east line of section 4, on north by north line of section 4, on west by logger railroad of [illegible] Lumber Company and on south by Bumblebee Creek. This block has in it the permanent [illegible] study plot which should not be worked.

Block No. [illegible]

A large block of south exposure was cut with the [illegible], which can probably be worked with scout crew. [illegible] acres. In section 15. Bounded on north by north line of section 15 on east by east line down to Herring Creek on south by Herring Creek and [illegible], on west by west line of section 15 up to road and on the northwest by main road. No streams of any size cutting the block. Some rather rocky area east upper end of block.

Block No. [illegible]

A large area of about [illegible] acres of north exposure 4 year cut, in east half of section 8, and west edge of section 9, contains some brushy areas but mostly fair working conditions, good sugar pine type. [illegible] distributed generally over the area, mostly [illegible]. [illegible]

streams which have running water. Bounded on west by lower main line of Pickering Lumber Company, on south by Blocks No. 10 and 26 on east by Block No. 33 and on north by north line of section 8.

Block No. 37

A block of north exposure sugar pine-fir lying in south side of section 16 and a small area of north edge section 21, about 200 acres. Fair working conditions, Ribes conditions not bad. Containing all the area in section 16 south of the Stanislaus River and extending into section 21 to the top of the ridge and taking in about 10 acres in northeast corner of section 20 between river and road.

Block No. 38

This is a stream type along the Stanislaus River starting at the crossing of the main road below Strawberry, it extends across section 16, to east line, taking in that portion of Herring Creek which is in section 16, and also all the area between Herring Creek and the Stanislaus River which is in section 16, probably about 20 acres total.

Block No. 39

An area of west exposure sugar pine-fir triangular in shape containing about 80 acres. This area is in section 21, was originally in Block No. 31, 1926 area. Rather brushy and heavy reproduction with plenty of Ribes. This block is bounded on west by road from Pinecrest to Strawberry, and the other two sides of the triangle are marked with triangle paper trail.

NOTE by P. E. Melis: The above listed Block No. 39 and the part of Block No. 37 lying in section 21 were eradicated in September, 1926.

GENERAL ACTIVITIES DURING 1926

The report which here follows deals with those activities of the Western Branch of the Office of Blister Rust Control which are not definitely a part of the work in any given state. They are, in every case, directly supervised by one of the project leaders in the Spokane office. Under this general heading come, scouting for the disease in eastern British Columbia, pine damage studies at Cheekye, British Columbia, quarantine inspection work, educational work. There is also appended a financial report, showing the disbursement by this branch office during the calendar year 1926.

QUARANTINE REPORT FOR 1926

by
C. R. Stillinger,
Associate Pathologist.

Spring Inspection

Quarantine inspection work during the spring 1926 consisted of inspecting nursery shipments in order to detect violations of Federal quarantines 26 and 54 and State of Washington quarantines 7, 12 and 13.

Inspection work was started on about March first and continued into early May at the following points: Pendleton and Portland, Oregon; Tacoma, Seattle, Spokane and Pasco, Washington; Ogden, Utah; and Pocatello, Idaho. The two following tables give a summary of the shipments inspected at each point and the violations that were detected.

Table No. I

Summary of Inspection Work in West from Spring 1923 to Spring 1926, Inclusive

Inspection Point	Inspection Period	Origin and Mode of Transportation									No. Loose	Violations Found					
		E. Q. Z.			W. Z. Q.			Not Q. Z.				Federal			State		
		P. P.	Expr.	Frt.	P. P.	Expr.	Frt.	P. P.	Expr.	Frt.	P. P.	P.P.	Exp.	Frt.	P.P.	Exp.	Frt.
Pasco	Spring '26	67	132	0	391	1049	28	677	1252	106	554	0	1	0	0	0	0
	Fall '25	8	52	1	242	298	14	17	112	28	6	0	0	0	0	0	0
	Spring '25	82	246	8	1640	2191	95	163	299	101	1657	0	0	0	0	0	0
	Fall '24	11	62	1	56	319	33	25	147	41	88	0	0	0	0	0	0
	Spring '24	82	168	3	1316	397	67	64	417	85	48	1	1	0	0	0	0
	Fall '23	1	3	0	7	76	11	38	109	46	--	0	0	0	0	0	0
	Spring '23	3	8	0	30	186	15	107	251	50	--	0	1	0	0	0	0
Total		254	671	13	3662	4516	263	1089	2587	457	2453	1	[illegible]	0	0	0	0
Pendleton	Spring '26	54	155	7	417	568	8	185	529	8	613	0	0	0	0	0	0
	Fall '25	4	29	0	22	53	1	51	198	10	27	0	0	0	0	0	0
	Spring '25	122	263	386	372	564	945	259	351	391	746	0	2	0	0	0	0
	Fall '24	4	11	0	2	69	6	23	140	11	0	0	0	0	0	0	0
	Spring '24	137	136	0	497	189	7	434	445	25	57	1	1	0	0	0	0
	Fall '23	8	44	0	19	53	25	74	50	6	--	0	0	0	0	0	0
	Spring '23	32	51	17	86	131	17	407	560	48	--	0	1	0	0	0	0
Total		361	689	410	1415	1627	1009	1433	2273	699	1443	1	4	0	0	0	0
Portland	Spring '26	951	336	0	829	542	11	244	73	0	0	4	1	0	0	0	0
	Fall '25	237	235	36	1447	926	168	212	365	63	1203	1	0	0	0	0	0
	Spring '25	868	310	13	675	209	12	917	201	14	2470	5	1	18	1	0	0
	Fall '24	48	115	93	510	267	303	52	70	62	446	0	1	0	0	0	0
	Spring '24	184	302	[illegible]	321	263	27	133	291	53	23	3	0	0	0	0	0
	Fall '23	2323	102	37	1657	205	510	1583	192	157	--	0	1	-	0	0	0
	Spring '23	191	376	34	313	205	40	197	1041	41	--	3	[illegible]	0	0	0	0
Total		4802	1776	221	5752	2617	1071	3338	2233	390	4142	16	7	18	1	0	0
Seattle	Spring '26	638	159	3	5275	1057	6	703	92	9	1874	12	0	0	12	4	0
	Fall '25	145	273	0	1776	1540	1	1971	130	36	2	0	1	0	7	4	0
	Spring '25	481	81	1	2404	879	105	250	148	29	116	4	2	0	13	2	0
	Fall '24	80	74	2	2383	539	18	254	108	11	2706	5	0	0	5	0	0
	Spring '24	649	324	0	1019	439	16	450	552	15	0	8	1	0	5	0	0
	Fall '23	68	93	15	345	132	29	129	98	1	-	9	1	0	4	1	0
	Spring '23	160	102	10	184	110	29	796	495	48	-	[illegible]	1	0	15	0	0
Total		2221	1106	31	13386	4696	204	4553	1623	149	4698	41	6	0	61	11	0
Spokane	Spring '26	7751	618	38	787	1593	119	2003	1399	71	1200	1	0	0	0	0	0
	Fall '25	739	104	22	125	186	15	87	147	69	132	0	0	0	0	0	0
	Spring '25	8117	457	37	957	1106	74	1669	1501	139	2608	1	0	0	0	0	0
	Fall '24	109	58	2	179	201	15	123	55	26	199	0	0	0	0	0	0
	Spring '24	5464	276	23	1056	772	176	711	387	182	88	0	1	0	1	1	0
	Fall '23	371	52	2	83	153	13	64	38	12	-	1	0	0	0	0	0
	Spring '23	5002	289	0	1406	1283	15	556	632	77	-	3	2	0	0	2	0
Total		27553	1854	124	4593	5294	426	5213	4059	576	4227	6	3	0	1	3	0
Tacoma	Spring '26	338	26	0	359	83	0	122	62	0	67	0	0	0	0	0	0
	Fall '25	48	9	12	807	355	4	38	37	6	829	0	0	0	0	0	0
	Spring '25	284	26	0	364	333	0	119	65	0	470	1	0	0	0	0	0
	Fall '24	29	11	0	637	286	7	90	133	0	663	0	1	0	1	0	0
	Spring '24	170	34	0	337	85	11	138	82	0	64	2	0	0	2	1	0
	Fall '23																
	Spring '23	263	32	3	570	93	131	207	96	33	-	3	3	0	0	0	1
Total		1132	138	15	3074	1235	153	714	475	39	2568	6	4	0	3	1	1
Ogden	Spring '26	89	156	0	11	52	0	111	153	6	2	0	0	0	0	0	0
	Fall '25																
	Spring '25	122	171	4	30	425	4	136	127	13	126	0	1	0	0	0	0
	Fall '24																
	Spring '24																
	Fall '23																
	Spring '23	238	208	27	19	9	4	136	108	35	-	0	0	0	0	0	0
Total		449	535	31	60	486	8	383	388	54	128	0	1	0	0	0	0
Pocatello	Spring '26	21	25	0	2	0	0	37	41	0	22	0	0	0	0	0	0

Quarantine Violations

Spring - 1926

Shipper	Transporting Agency	Federal Quarantine # 26						Federal Quarantine # 54						State Quarantines 7, 12, 13					
		Black Currants		Other Ribes		White Pine		Black Currants		Other Ribes		White Pine		Black Currants		Other Ribes		White Pine	
		No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants
Nursery	Parcel Post			1	2	1	1							1	1	3	8		
	Express															3	15		
Individual	Parcel Post								2	14	103	1	3		1	8	40		
	Express									2	3					1	1		6
Total				1 -	2	1 -	1		2 -	16 -	106 -	1 -	3	1 -	2	15 -	64		6

Violations Federal Quarantine # 54 = 17 (3 pines)
" " " # 26 = 2 (1 pine)
" State Quarantines 7,12,13 = 16 (6 pines)
35 (10 pines)

Ribes shipments = 33 shipments 176 plants
Pine shipments = 2 " 10 "
35 " 186 "

Violations of Federal Quarantine by nurserymen - 2
" " " " " individuals - 17

Plant Shipments Inspected
Spring - 1936

Inspection Point	Period of Inspection	No. Ribes or Pine Shpts. From Eastern Quar. Zone	Western Quar. Zone	Not Quar. Zone	Number In-spected	Number Not In-spected	Number of Violations State	Federal	Number Shipments Reported to States	Number Loose Parcel Post
					PARCEL POST					
Pasco	3/1 - 5/6	67	391	677	1087	48				654
Pendleton	3/2 - 5/6	54	417	135	572	84				613
Portland	2/16 - 4/30	951	829	244	1930	94		4	15	
Ogden	3/10 - 4/15	89	11	111	100	111				
Seattle	3/4 - 5/15	628	5275	703	6264	342	12	12	118	1836
Spokane	3/2 - 5/6	7751	787	2003	9390	1151		1	2	1154
Tacoma	3/2 - 4/30	388	359	122	673	142			40	67
Pocatello	4/16 - 4/22	21	2	37	23	37				32
Total		9909	8071	4032	20042	2020	12	17	170	4346
					EXPRESS					
Pasco	3/1 - 5/6	132	1049	1252	2027	406		1	2	
Pendleton	3/2 - 5/6	155	568	529	1024	228				
Portland	2/16 - 4/30	336	542	73	932	19		1	2	
Ogden	3/10 - 4/15	156	52	155	198	163			7	2
Seattle	3/4 - 5/15	159	1057	92	1303	5	4		71	38
Spokane	3/2 - 5/6	618	1593	1390	2751	359			2	46
Tacoma	3/2 - 4/30	26	82	62	152	18				
Pocatello	4/16 - 4/22	25		41	27	39				
Total		1607	4044	3601	8410	1742	4	2	84	86
					FREIGHT					
Pasco	3/1 - 5/6		28	106	134				10	
Pendleton	3/2 - 5/6	7	3	3	13	10			3	
Portland	2/16 - 4/30		11		11				3	
Ogden	3/10 - 4/15			6		6				
Seattle	3/4 - 5/6	3	6	9	18				9	
Spokane	3/2 - 5/6	38	119	71	196	32				
Total		43	172	200	372	48			25	

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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Interstate Bridge at Portland, Oregon

Last spring it came to our attention that a great many people were making automobile excusions on holidays and Sundays from Oregon into Washington and bringing back whole or parts of Ribes sanguineum. Inspectors of the State Board of Horticulture, acting as collaborators of the Federal Horticultural Board, spent five Sundays on this bridge and intercepted 208 parties who were transporting this plant from Washington into Oregon. Since Oregon is not known to be generally infected and there is even a possibility that the disease is not definitely established in Oregon, it appears that vigorous efforts should be made to stop possible transportation of the disease by auto parties into Oregon. Under just what authority this situation can be handled, since the decision of the Supreme Court and the ammendment to the plant quarantine act, is somewhat of a question. The situation appears to be about as follows:

1. Oregon's old blister rust quarantine is null and void. It was under this quarantine last spring that the inspectors were able to stop the automobiles. Now no state regulation can be passed which applies to the interstate shipment of plants upon which there is a Federal quarantine. In other words Oregon can pass no regulation forbidding the shipment of R. sanguineum into the state of Oregon, hence has no authority to stop the automobiles for this purpose.

2. The solicitor has ruled that Federal Horticultural Board inspectors cannot stop automobiles for inspection purposes.

3. After these plants are carried into Oregon, they are "subject to the operation of the laws of such state, -- enacted in the exercise of its police powers to the same extent and in the same manner as though such nursery stock -- had been produced in such state." (3rd proviso of amendment to Plant Quarantine Act.)

4. Regulation 6 of quarantine 18 of the State of Oregon states "with the exception of the seven couties named in Regulation 3, this quarantine does not restrict the growing and movement of the currant (except the European black currant) and gooseberry plants within the State."

Under these circumstances it apparently would be assumed that the plants originated, according to the state law, in Multnomah County (not one of the seven counties quarantined) hence they would not be contrary to the Oregon quarantine No. 18 and the police power of the State.

5. Section 8661, line 18, Horticultural Laws of Oregon, 1926 says, "---or in case such fruit trees or nursery stock, although apparently sound and not infected by any pest, shall have been from an infested district beyond the limits of this State, they shall also notify the owner or owners or persons in charge of or in possession of the same, and shall require said persons to eradicate or destroy --- such imported fruit trees or nursery stock."

If this portion is still constitutional, it is ample authority for the state inspectors to handle the destruction of the _R. sanguineum_ plants. But due to the amendment to the plant quarantine act and the Supréme Court decision, the clause would be non-operative as far as blister rust host plants are concerned.

The whole matter is in a rather confused situation and I believe that it should be submitted to the solicitor for a decision as to just what and how far a member of the Federal Horticultural Board can now go in handling this situation. Likewise it should be referred to the Attorney General of Oregon for a decision as to the authority of the State of Oregon in this matter. After the powers of each have been determined, then we shall be able to develop methods to stop these shipments in the proper way. This matter should be settled by the first of April at the latest.

Inspection Work at Ogden, Utah, and Pocatello, Idaho

For sometime there had been some question as to the advisability of carrying on inspection work at Ogden, Utah. Likewise, there was a question whether if inspection work was done at Ogden, it should not also be done at Pocatello, Idaho. In order to get information regarding this situation, Mr. Johnson, who had been doing the inspection work at Ogden for several seasons, was asked to spend part of his time last spring at Pocatello, Idaho. The report of his investigation and conclusions follows this introduction. The importance of the inspection work in the Middle West agrees with observations that have been made several times in the examination of the middle western points. I agree with his recommendations regarding all points except possibly Spokane. I shall deal with the matter later in this report.

The following report by Mr. Johnson is quoted in full:

"While performing inspection duties at Ogden and Pocatello the past spring season, it occurred to me that a Federal inspector at either of these places was working in the dark and the only excuse for continuing inspection was that a quarantine against Ribes and white pine existed and a shipment might be intercepted which had been overlooked by the inspector at Omaha or Kansas City and which might not be observed by the local inspector at Ogden. (In 1925 I beat the local inspector to it and reported a shipment of white pines from the D. Hill Nursery which was being held for his inspection. This same shipment did get past the inspector at Omaha.)

"My contention is this, an inspector working at Council Bluffs (inspecting mail exclusively) together with inspector at Omaha can inspect all the express that is possible for inspectors at Ogden and Pocatello to inspect. The inspector at Council Bluffs can inspect 80 per cent more parcel post shipments than the inspectors at Ogden and Pocatello. In other words the inspector can examine 100 per cent of mail leaving Council Bluffs (terminal and outside mail) while inspectors at Ogden and Pocatello inspect a combined total of only 20 per cent in transit.

"Here are the facts:

"Union Pacific Nos. 9 and 19 are the mail trains arriving at Ogden carrying mail and express from the E. Q. Z. into Utah, Nevada and California. Only 10 per cent of the mail can be inspected at Ogden during a shifting process. Union Pacific No. 5 is the mail and express train carrying mail and express from E. Q. Z. to Idaho, Montana and Pacific Northwest. It passes through Pocatello. This big train is a part of the Union Pacific No. 19 when it leaves Council Bluffs, but at Green River, Wyoming, it is detached from No. 19 and becomes No. 5. Approximately 10 per cent of this mail can be inspected at Pocatello during a shifting process, whereas 100 per cent of all mail, terminal and loose, carried by Union Pacific Nos. 9, 19, and 5 can be inspected at Council Bluffs.

"All express from E. Q. Z. open for inspection at Ogden and Pocatello can be inspected at Kansas City and Omaha, so nothing can be inspected at Ogden and Pocatello which cannot be inspected at Omaha or Kansas City.

"The sealed cars cannot be inspected at Omaha, Ogden, or Pocatello; such cars are sealed at Chicago and must be inspected there or at destination. Union Pacific trains No. 9 and 19 have sealed cars consigned to Sacramento and San Francisco, and Union Pacific No. 5 has sealed cars for Pendleton, Portland, and Portland, all of which can be inspected at Chicago on schedule time.

"While performing inspection duties at Ogden and Pocatello the past spring season, it occurred to me that a Federal inspector at either of these places was working in the dark and the only excuse for continuing inspection was that a quarantine against Ribes and white pine existed and a shipment might be intercepted which had been overlooked by the inspector at Omaha or Kansas City and which might not be observed by the local inspector at Ogden. (In 1925 I beat the local inspector to it and reported a shipment of white pines from the D. Hill Nursery which was being held for his inspection. This same shipment did not pass the inspector at Omaha.)

"My contention is this, an inspector working at Council Bluffs (inspecting mail exclusively) together with inspector at Omaha can inspect all the express that is possible for inspectors at Ogden and Pocatello to inspect. The inspector at Council Bluffs can inspect 90 per cent more parcel post shipments than the inspectors at Ogden and Pocatello. In other words the inspector can examine 100 per cent of mail leaving Council Bluffs (terminal and outside mail) while inspectors at Ogden and Pocatello inspect a combined total of only 10 per cent in transit.

"Here are the facts:

"Union Pacific Nos. 9 and 19 are the mail trains arriving at Ogden carrying mail and express from the E. & S. into Utah, Nevada and California. Only 10 per cent of the mail can be inspected at Ogden during a shifting process. Union Pacific No. 5 is the mail and express train carrying mail and express from E. & S. to Idaho, Montana and Pacific Northwest. It passes through Pocatello. This mail train is a part of the Union Pacific No. 19 when it leaves Council Bluffs, but at Green River, Wyoming, it is detached from No. 19 and becomes No. 5. Approximately 10 per cent of this mail can be inspected at Pocatello during a shifting process, whereas 100 per cent of all mail, terminal and loose, carried by Union Pacific Nos. 9, 19, and 5 can be inspected at Council Bluffs.

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"The information regarding routing of mail was obtained from Chief Mail Clerks who thoroughly understand the routing of all mail coming into and passing through their territory. Information concerning express was obtained from experience, study of waybills and traveling express agents.

"In the early days when our inspection system was inaugurated Council Bluffs did not yield the proper results because the inspector had to ply between there and Omaha and the most attention was devoted to the three tie outs and less attention to incoming trains carrying loose mail which never entered the terminal and which was loaded on west bound trains during the inspectors absence at night.

"On the accompanying sheet I have indicated roughly inspection centers of importance and others of lesser importance which might be eliminated.

"The inspector at St. Paul should intercept contraband material consigned to Montana, Idaho and Washington.

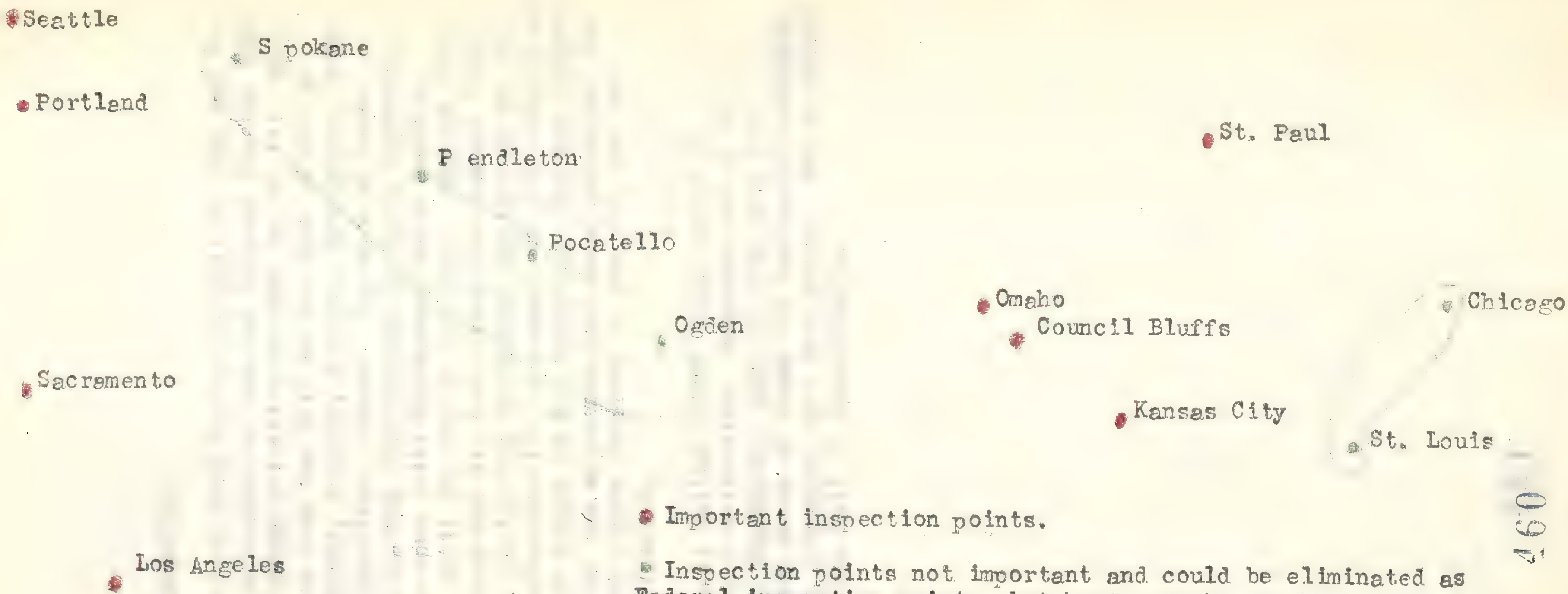
"Inspectors at Omaha and Council Bluffs should intercept contraband material consigned to Utah, southern Idaho, southwestern Montana, California, Oregon and Washington,

"Inspectors at Kansas City should intercept contraband material consigned to Utah, Idaho, Montana, Washington, Oregon and California (states without commercial white pine not mentioned).

"Inspector at Chicago could inspect material which goes through in sealed cars, but inspection point not highly important since state and Federal inspectors are stationed at points along coast and stock can be inspected upon arrival at destination.

"Spokane, Pendleton, Pocatello and Ogden, all intermediate points, could be eliminated as far as Federal inspection is concerned. Such places could be left to local inspectors to enforce state quarantines and incidentally pick up Federal violations which might slip through.

"Federal and state inspectors at Seattle, Portland, Sacramento and Los Angeles should intercept the southern movement of all blister rust host plants along west coast."



Important inspection points.

Inspection points not important and could be eliminated as Federal inspection points, but kept open by local inspectors to enforce State and Federal quarantines.

Fall Inspection

Quarantine inspection work during the fall of 1926 was for the purpose of detecting violations of the new Federal Blister Rust Quarantine No. 63, which became effective October 1st of this year. Inspection work was started from the 13th to the 16th of October at the following points: Pasco, Seattle, Spokane, and Tacoma, Washington; and Pendleton and Portland, Oregon. The work at Pasco, Pendleton, Spokane and Tacoma was discontinued in early December. Portland, Oregon, was kept open until Christmas, while Seattle, Washington, was continued until the end of the year. Besides this inspection work, Mr. Goodding and Mr. Hornibrook did special field inspection work in Oregon, pertaining to Federal Quarantine No. 63, and State of Oregon Quarantine No. 18. A summary of this work is given in the report for the State of Oregon by Mr. Goodding. The two following tables give a summary of the shipments that were inspected; the number of blister rust host plants observed in transit; and the violations which were intercepted.

Special attention is called to the large number of violations which consisted of white pine. Eighteen out of 21 violations were white pine shipments. Most of them were for Christmas trees or were only parts of trees for decorative purposes. In the past, very few pine shipments have been noted. Why we should find such a large number this fall is inexplicable.

Shipments Inspected
Fall - 1926

Inspection Point	Period of Inspection	No. Ribes or Pine Shipments from: Eastern Quar. Zone	Western Quar. Zone*	Non Quar Zone	Number In - spected	Number Not In - spected	Number of Violations: State	Federal	Number of Shipments Reported to States	Number Loose Parcel Post
				P A R C E L P O S T						
Pasco	10/13 - 12/2				272					196
Pendleton	10/16 - 12/3			1	99					3
Portland	10/13 -12/23				1246					10
Seattle	10/16 -12/31		53		4932		5	12	47	2823
Spokane	10/14 -12/7		2	3	1688			3	4	674
Tacoma	10/15 -12/14		1	13	850	5			9	593
Total			56	17	9087	5	5	15	60	4299
				E X P R E S S						
Pasco	10/13 -12/2		2		444					
Pendleton	10/16 -12/3				236	2			3	
Portland	10/13 -12/23				1154					
Seattle	10/16 -12/31		48		1726	9		1	79	
Spokane	10/14 -12/7		3	10	870	2			11	
Tacoma	10/15 -12/14			14	534				7	
Total			53	24	4964	13		1	100	
				F R E I G H T						
Pasco	10/13 -12/2				107	7			7	*
Pendleton	10/16 -12/3				2	16			11	
Portland	10/13 -12/23				272					
Seattle	10/16 -12/31				54				43	**
Spokane	10/14 -12/7				73	14			16	
Tacoma	10/15 -12/14				27					***
Total					535	37			82	

* One car not inspected - Reported to State.
** One car inspected and reported to State - One car not inspected.
*** Twelve cars inspected.

Violations Intercepted

Fall - 1926

Shipper	Transporting Agency	Federal Quarantine No. 63											State Quarantines 7, 12, 13					
		Black Currants		Other Ribes		White Pine		Nature of Violation					Black Currants		Other Ribes		White Pines	
		No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants	Contents not listed	No. Inspection Tag	Shipment from Eastern Quar. Zone	Shipment from Western Quar. Zone	Shipment from Non Quar. Zone	No. Violations	No. Plants	No. Violations	No. Plants	No. Violations	No. Plants
Nursery	P. P.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Freight	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Individual	P. P.	0	0	1	12	14	25	15	15	0	11	4	0	0	2	13	3	9
	Express	0	0	0	0	1	1	1	1	0	1	0	0	0	00	0	0	0
	Freight	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total				1	12	15	26	16	16	0	12	4	0	0	2	13	3	9

No. Violations Quarantine 63 -- 15 (26 pines)
" " " " 1 (12 Ribes)

No. State Violations 3 (9 pines)
" " " 2 (13 Ribes)

Total Ribes Shipments - - 3 of 25 plants
Total Pine Shipments - - 18 of 35 plants
21 60

No. Fed. Violations - No Tag 16
" " " " Contents not Listed 16
" " " Q. Area 12
" " " Non Q. Area 4

The Christmas Tree Trade in Western Washington

During the fall inspection, it came to our attention that there was considerable shipping of Christmas trees out of the coast region of Washington, especially from the Puget Sound region. Since there is scattered white pine throughout this region and further since blister rust infection is developing on the white pine in this region, it seemed highly possible that some white pine carrying blister rust might be shipped as Christmas trees. For these reasons, Mr. Felch was assigned to an investigation of this matter. He did not start the work until the shipping season for Christmas trees was nearly past, so that his report is only preliminary to further investigation in this matter. The following is his preliminary report quoted in full:

"In gathering information, the following towns were visited: Tacoma, Gig Harbor, Port Orchard, Bremerton, Silverdale, Seattle, Kirkland, Everett, Bellingham and a dozen little towns and sidings within twenty miles south of Tacoma.

"Interviews were had with the following: railroads, postmasters, American Railway Express Company, steamship companies, dock managers, port officials, Chamber of Commerce, U. S. Forest Service, state inspectors, Christmas tree shippers, U. S. Customs, Washington State Fire Association, Mr. Joy, State Forester (by phone) inspectors employed by large Christmas tree shipping concerns, loggers and others;

"A great many contradictory reports were received concerning location of white pine, use of white pine for Christmas trees, extent of the trade, cutting areas, methods of transportation, destination of Christmas trees, and the proper office of the railroads with which to deal. There is quite a general impression that there are but few if any white pines west of the Cascades and that none are used for Christmas trees.

"Nearly all the Christmas tree shippers and transportation companies talked with, expressed a willingness to help prevent violations of the quarantine. The concerns that ship many carloads are particularly anxious to observe the quarantine regulations and furnished lists showing place and dates of loading.

"Only one white pine was seen in the region south of Tacoma. White pine are scattering from Gig Harbor north to Silverdale and probably over most of the Olympia Peninsula. Occasional trees were seen along the road from Seattle to Bellingham.

"A few years ago the Christmas tree trade was carried on by a large number of individuals who shipped one or a few carloads; now probably 75 per cent of the trees are handled by four or five concerns that ship from twenty to over a hundred carloads apiece. However, there are still some small shippers and new ones are trying it each year.

"As a rule the big concerns do not cut their own trees, but buy them from farmers and others who cut them, tie them in bundles of three to five trees, and haul them to the freight car. Here, an inspector of the concern looks over the trees as they are loaded. About 3500 trees are put in each car. The total number of cars shipped from Washington is not now known, but that information is expected from the railroads some time in January or February.

"Probably over 90 per cent of the Christmas trees cut in western Washington are fir, with a few spruce, cedar and hemlock, and occasionally a pine. It seems that the trade generally demands fir. Reports were received of white pines having been shipped to California, but they did not sell well.

"Experienced shippers are not likely to take pine of any kind, but new and inexperienced ones are not so particular. A few yellow and lodgepole pine were moved by small shippers in 1926.

"The cutting of Christmas trees begins the last of October and by the 10th of December practically all car lot shipments have moved from Washington. The cutting areas extend from Vancouver Island to Portland. Most of the trees are taken from logged off lands. An area may be cut over and then left a few years before cutting again. For this reason shipping points will change each year.

"A car loaded with Christmas trees cannot be satisfactorily inspected for white pines. The most feasible time is while the trees are piled beside the railroad track awaiting shipment, or before they leave the cutting area.

"Some Christmas trees move to California by boat. Often barges are loaded at points on the Sound and are then towed to Seattle or Tacoma, where the trees are transferred to boats. On Vancouver Island trees were loaded directly in box cars, moved by car ferries to the mainland in B. C. and came down through Washington by rail to California. It is not known whether any boats carry Christmas trees directly to California from B. C. or not. Trees have gone to California by boat from Tacoma, Seattle, and Bellingham, and probably from the Grays Harbor region, Portland and Columbia River points.

"[illegible] years ago the Christmas tree trade was carried on by a large number of individuals who [illegible]ipped one or a few carloads; [illegible]bly 75 per cent of the trees [illegible] by four or five concerns that ship from twenty to [illegible] hundred carloads apiece. [illegible], here are still some small [illegible]

"[illegible] their own [illegible], [illegible] cutters and [illegible], tie them in [illegible] five trees, and [illegible] to the freight car. Here, an inspector [illegible] concern look[illegible] the trees as they are [illegible] are put in each car. The total number [illegible] [illegible]ngton is not now known, but that information [illegible] some time in January or February.

"[illegible] 50 per cent of the Christmas trees cut in [illegible], with a few spruce, cedar and hemlock, [illegible]. It seems that the trade generally demands [illegible] white pines having been shipped to [illegible] well.

"Experienced shippers are not likely to take pine of any kind, but new and inexperienced ones are not so particular. A few yellow and lodgepole pine were moved by small shippers in 1936.

"The cutting of Christmas trees begins the last of October and by the 10th of December practically all car lot shipments have moved from Washington. The cutting areas extend from Vancouver Island to Portland. Most of the trees are taken from logged off lands. An area may be cut [illegible] left a few years before cutting [illegible] points will change each year.

"[illegible]ristmas trees cannot be satisfactorily inspected [illegible] feasible time is while the trees are [illegible]ed track awaiting shipment, or [illegible]

"Some Christmas trees move to California by boat. Often barges are loaded at points on the Sound and are then towed t[illegible] [illegible], trees are transferred to boats. On Vancouver Island trees were loaded directly in box cars, moved by car ferries to the mainland in B. C. and came down through Washington by rail to California. It is not known whether any boats carry Christmas trees [illegible] from B. C. or not. Trees have gone to [illegible] Tacoma, Seattle, and Bellingham, and probably from the Grays Harbor region, Portland and Columbia River points.

"The state inspectors seem to have good cooperation from the steamship companies in Seattle, and inspect all trees leaving by boat from there.

"It is said that sea water ruins Christmas trees. For this reason probably none are moved down the coast on barges.

"Quite a number of Christmas trees are sent by express. Most of them are individual shipments between friends. In a few cases trees are shipped by express for sale. Most express shipments are between the 1st and 25th of December. In 1926, 35 white pines were found moving by express in violation of state and Federal quarantines.

"A number of small Christmas trees are mailed. In 1926, 17 violations consisting of white pines were found in the mail. Probably the present inspection methods get most of the violations moving by mail and express.

"If the people interviewed were a fair sample, the quarantine on the movement of white pines is not generally known. This applies to transportation companies, postal employees, and express agents as well as to Christmas tree shippers.

"Some of the state inspectors are not well informed on the State and Federal blister rust quarantines. In one case the belief was that Federal Quarantine No. 63 applied to host plants moving intrastate. Little effort is made to enforce the state quarantine prohibiting the movement of white pine within the coast area. Three violations were found in Seattle and two in Everett of white pine being sold for Christmas trees.

"There is considerable public opposition to the present wholesale method of cutting Christmas trees and it is quite likely that within a few years there will be some state regulations imposed.

"In conclusion: While no white pine were found moving out of Washington during the investigation it is believed for the following reasons the Christmas tree shipments should be watched: white pine have been sent to California; new shippers who are likely to take pine are coming into the business every year; white pine are sold on the coast for Christmas trees; numerous white pine moving by mail and express are found; yellow and lodgepole pine are occasionally shipped out; white pine are scattered over most of the coast region; the number of infected trees is increasing; and Christmas trees are cut in known infected localities and shipped to California.

Recommendations

"A. That more information be gathered concerning:

"1. Shipments of Christmas trees by boat from Portland, Longview, Olympia and Grays Harbor regions.

"2. Location of white pine, if any, in southwestern Washington.

"3. Movement of Christmas trees from Vancouver Island.

"B. General publicity.

"1. Articles to be placed in all coast papers about November 15th.

"2. Quarantine notice or poster to be made and put up in various places.

"C. All known shippers of Christmas trees to be notified of the quarantine and instructed as follows:

"1. Not to ship any white pine.

"2. To report every shipment giving
a. place and date of loading
b. name of carrier
c. city of destination.

"Names of shippers to be secured from information supplied by the railroads.

"D. Mail

"1. Take up with the post offices the matter of having postal employees properly informed of quarantine.

"2. Quarantine posters to be put up in all western Washington post offices.

"E. Express, American Railway.

"1. Poster to be put up in offices.

"2. Agents to receive special instructions.

"F. Steamship companies

"1. About November 1st a letter to all steamship companies (except the Pacific) asking the following cooperation:
a. Post quarantine notices on docks.
b. Agents to be instructed to inform Christmas tree shippers of the quarantine.
c. Report shipments.

"2. The Pacific S. S. Co. does some business in British Columbia and a special letter to them may reach their agents there.

" G. Freight, Railroad.

"Cooperation requested as follows:

"1. Name and address of 1926 Christmas tree shippers, and points of shipment.

"2. Number of freight depots.

"3. Posters to be put up in depots.

"4. Freight agents to be instructed.

"5. Report of all Christmas tree shipments.

"H. Man to be located at some coast point, probably Seattle, from about October 25th to December 20th. Duties as follows:

"1. Inspect as many of the freight shipments of Christmas trees as possible, particularly from new shippers, known infected areas, and shipments consigned to California.

"2. While inspecting cutting areas gather more information on the location of white pine.

"I. In Cooperation with the State

"1. Instruct all western Washington inspectors on the state and Federal blister rust quarantines.

"2. Send a copy of the Washington key to quarantine No. 63 and a quarantine poster to state inspectors.

"3. If the state does pass some regulations on the cutting of Christmas trees, try to have a clause in it prohibiting the cutting of white pine."

Quarantine Poster

In the dissemination of information regarding the blister rust quarantine, the most valuable means of keeping the matter constantly before the public is by means of posters, placed at all points from which blister rust host plants may be shipped. In all cases where the matter has been taken up with the transporting agencies a request has been made for a poster of some kind. In order to fill this need a posture was prepared and submitted to the Washington Office.

Since it appears very desirable that the poster be as brief as possible and consequently contain only essential information, if it is to be read by the general public, a poster was prepared which was adapted to the western blister rust situation. Five thousand of these were requested.

Analysis of Quarantine No. 63

Because of the length of quarantine No. 63 and its many cross references, it has been our experience that the transporting agencies, shippers and inspectors have considerable difficulty in comprehending it. For these reasons our endeavor has been to simplify the facts as much as possible and try to state the regulations in such form that they can be made more readily usable for reference purposes.

Chiefly forthe use of the members of the Western Office of Blister Rust Control, a large summary chart was prepared. Knowing the state of origin and destination and the type of blister rust host plants in question, anyone can readily and quickly determine the regulations regarding such a shipment. A copy of this chart is given with this report.

In order to simplify the regulations still more it has been found practical to develop an outline of the blister rust regulations as they affect the movement of blister rust host plants into or out of any particular state. The shippers' transporting agencies and inspectors are only concerned with shipments originating or coming into their own state. In other words, this chart for each state shows the relation of one state to forty-seven others instead of showing the relation of all forty-eight states to each other. Upon issuing this simplified outline, an immediate demand developed in each state for the outline for that state. Thus far such outlines have been developed for California, Oregon, Washington and Idaho. A copy of the outline for Idaho is submitted with this report.

SUMMARY No. 5.

OUTLINE OF THE REGULATIONS OF QUARANTINE No. 63.

By using the chart you may determine what shipments may be made from any state to any other state in the United States. If it is found that the shipments can be made then by following this outline the requirements for the shipment under Federal quarantine No. 63 can be determined.

A. White pines.
  1. Shipments which can be made must meet the following requirements on outside of car, box, bale or other container:
     a. Name and address of consignor.
     b. Name and address of consignee.
     c. Contents marked on outside "five-leafed pine", "white pine".
     d. Certificate of state nursery inspector of state where grown stating following: (Regular State certificate is satisfactory.)
        (1) Plants contained and premises where grown inspected within one year of date of shipment.
        (2) Date of inspection.
        (3) Plants and premises free from blister rust.
     e. If destined to a state having a control area, a permit issued by the nursery inspector of state of destination.
  2. If carload or bulk shipment, the permit and certificate shall accompany the waybills or other bills of transportation.
  3. Shipments can be made at any time during the year.

B. Cultivated black currants.
  1. Shipments which can be made must meet following requirements on the outside of each box, car/bale or other container:
     a. Name and address of consignor.
     b. Name and address of consignee.
     c. Contents marked as "European Black Currants".
     d. Certificate of state nursery inspector of state where grown stating following: (Regular State certificate is satisfactory.)
        (1) Plants contained and premises where grown were inspected during period Aug. 15 to Sept. 30 preceding date of shipment.
        (2) Date of inspection.
        (3) Plants and premises free from blister rust.
     e. No permit on account of a control area is necessary.
  2. If carload or bulk shipment, the certificate shall accompany the waybill or other bills of transportation.
  3. Shipments can be made only between October 1 and May 15.

C. Cultivated red, white and alpine currants and cultivated gooseberries.
  1. When only cultivated red, white or alpine currants and cultivated gooseberries can be shipped the following requirements must be met on the outside of each box, car, bale or other container:
     a. Name and address of consignor.
     b. Name and address of consignee.
     c. Contents "currants and gooseberries".
     d. Certificate of state nursery inspector of state where grown showing: (Regular State certificate is satisfactory.)
        (1) Plants in question and premises where grown inspected within one year of date of shipment.

(2) Date of inspection.
(3) Found free from blister rust.

e. Permit from inspector of state of destination if state of destination has a control area.
f. A permit tag from Federal Horticultural Board to consignor giving:
   (1) Serial number of permit.
   (2) Date of certification by Federal Horticultural Board inspector.
   (3) A signed certificate from the consignor stating:
      (a) Cultivated red, white and mountain currants and cultivated gooseberries in said shipment are the plants referred to on this permit tag.
      (b) Before shipment plants were immersed in solution of lime-sulphur testing not less than 4.5 degrees Baume.
g. Permit tag valid only during following shipping season.

2. In order to receive certification from a Federal Horticultural Board inspector the following requirements must be met:
   a. Plants and premises where grown must be inspected during the period August 15 to September 30, preceding the shipping period of October 1 to May 15, except in Oregon and Washington, in which states the period of inspection is September 1 to October 31 preceding the shipping season of November 1 to April 15.
   b. Plants and premises must be free from blister rust.
   c. No cultivated black currants growing within radius of one mile of where plants were grown.
   d. Vicinity within one mile radius of the plot must be free from blister rust.
3. Can be shipped only between October 1 and May 15 of year of inspection, except in Oregon and Washington, in which states the shipping period is between November 1 and April 15.
4. Plants when shipped must be in dormant and defoliated condition.

D. All currants and gooseberries except cultivated black currants.

1. Shipments which can be made of all currants and gooseberries must meet the following requirements on the outside of the car, box, bale, or other container:
   a. Name and address of consignor.
   b. Name and address of consignee.
   c. Contents marked on outside "currants and gooseberries".
   d. Certificate by state nursery inspector of state where grown stating the following: (Regular State certificate is satisfactory.)
      (1) Plants in question and premises where grown were inspected within one year of time of shipment.
      (2) Date of inspection.
      (3) Plants and premises free from blister rust.
   e. If destined to state having a control area, a permit issued by the nursery inspector of the state of destination.
2. If carload or bulk shipment, the permit and certificate shall accompany the waybill or other bill of transportation.
3. Shipment can be made during any time of the year.

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KEY TO PROVISIONS OF FEDERAL QUARANTINE NO. 63
AS APPLIED TO BLISTER RUST HOST PLANTS DESTINED TO IDAHO.

From	White Pine	Black Currant	Cult. red, white & alpine currants & cult. gooseberry	Other currant and gooseberry plants
Alabama	Prohibited	Prohibited	A	A
Arizona	A	"	A	A
Arkansas	Prohibited	"	A	A
California	A	"	A	A
Colorado	A	"	A	A
Connecticut	Prohibited	"	A-B-C-E	Prohibited
Delaware	"	"	A	A
D. C.	"	"	A	A
Florida	"	"	A	A
Georgia	"	"	A	A
Illinois	Prohibited	"	A	A
Indiana	"	"	A	A
Iowa	"	"	A	A
Kansas	A	"	A	A
Kentucky	Prohibited	"	A	A
Louisiana	"	"	A	A
Maine	"	"	A-B-C-E	Prohibited
Maryland	"	"	A	A
Massachusetts	"	"	A-B-C-E	Prohibited
Michigan	"	"	A-B-C-E	"
Minnesota	"	"	A-B-C-E	"
Mississippi	"	"	A	A
Missouri	"	"	A	A
Montana	A	"	A	A
Nebraska	A	"	A	A
Nevada	A	"	A	A
New Hampshire	Prohibited	"	A-B-C-E	Prohibited
New Jersey	"	"	A-B-C-E	"
New Mexico	A	"	A	A
New York	Prohibited	"	A-B-C-E	Prohibited
North Carolina	"	"	A	A
North Dakota	A	"	A	A
Ohio	Prohibited	"	A	A
Oklahoma	A	"	A	A
Oregon (clean)	A	"	A	A
Oregon (infected)	Prohibited	"	A-B-D-E	Prohibited
Pennsylvania	"	"	A-B-C-E	"
Rhode Island	"	"	A-B-C-E	"
South Carolina	"	"	A	A
South Dakota	A	"	A	A
Tennessee	Prohibited	"	A	A
Texas	A	"	A	A
Utah	A	"	A	A
Vermont	Prohibited	"	A-B-C-E	Prohibited
Virginia	"	"	A	A
Washington	"	"	A-B-D-E	Prohibited
West Virginia	"	"	A	A
Wisconsin	"	"	A-B-C-E	Prohibited
Wyoming	A	"	A	A

*Counties in Oregon infected: Clatsop, Columbia, Tillamook, Washington, Yamhill and Lincoln.

LEGEND

A. Must be marked to show the names and addresses of the consignor and consignee and contents as to five-leafed pines or currants or gooseberries. Must be accompanied by certificate of nursery inspection of state of origin to the effect that plants and premises were inspected within one year (giving date of inspection) and found free from white pine blister rust. (Regular state certificate is satisfactory.)

B. Each container must have attached a permit tag bearing (1) the serial number of the permit issued by the Federal Horticultural Board to the consignor; (2) the date of the certificate issued the consignor by the Inspector of the Federal Horticultural Board; (3) a certificate from the consignor stating that the currant and gooseberry plants in the shipment are the plants to which the Federal permit and inspection certificate, referred to on the permit tag accompanying the shipment, apply; and that before said plants were shipped they were immersed in a solution of lime-sulphur.

C. Admissible only between October 1 and May 15 following.

D. Admissible only between November 1 and April 15 following.

E. Must be dormant and defoliated.

PROVISIONS OF THE FEDERAL WHITE PINE BLISTER RUST QUARANTINE PERTAINING TO SHIPMENT OF HOST PLANTS MOVING FROM IDAHO TO OTHER STATES.

1. European black currants are prohibited from moving interstate.

2. Five-needled pines and currant and gooseberry plants (except European black currant) from Idaho may be moved out of Idaho if they meet the requirements of A; and in addition bear a permit from the State of destination, if the shipment is consigned to a state having a legally established blister rust control area.

Oregon State Quarantine No. 18

In the pursuance of the limiting of Federal Quarantine No. 63 to only a portion of Oregon, the State of Oregon passed state quarantine No. 18. This quarantine is even more stringent than Federal Quarantine No. 63 as far as the interstate shipment of blister rust host plants is concerned in the state of Oregon. A copy of this quarantine as well as the steps which have been taken to make it effective is covered in the report for the State of Oregon by state leader L. N. Goodding. The cooperation given by the State Board of Horticulture of Oregon with the Federal Horticultural Board representatives has been very satisfactory.

Inspection Points in the West and Their Importance

It has been felt for some time that certain inspection points in the West can and will be eliminated. The points were, after due investigation, selected on the basis of the amount of nursery stock shipment which might be inspected at that point. Only several seasons of actual inspection work could tell the importance or value of the points selected. Inspection work at most of the points has been carried on now for eight shipping seasons. In order to determine the importance of the different points, all of the information acquired at each of the points during the last few years has been compiled in Table No. I. This table shows at each point for each season the method of transporation and origin of all packages inspected and the violations that were found.

Table II is a condensed summary of Table I, eliminating the seasons and showing only the total material inspected at each point.

Tables I and II do not include the inspection work for the fall of 1926. This season was not included with the other seasons because the information was not recorded in the same form as that of the past seasons. A further reason for this was the change in the blister rust quarantine which became effective this fall. It was felt that possibly this would change the importance of these points.

In Table III all past work is combined with this fall's inspection work.

These tables show very plainly the facts regarding the importance of our different inspection points here in the West and consequently no detailed analysis is deemed necessary.

On the basis of the information presented in this report, the elimination of the following inspection points is recommended:

In the pursuance of the limiting of ... No. 63 to only a portion of Oregon, the ... quarantine No. 13. This quarantine is ... Federal Quarantine No. 63 as far as the ... blister rust host plants is concerned in ... copy of this quarantine as well as the ... to make it effective is covered in the ... Oregon by state leader L. N. Goodding. The cooperation given ... the State Board of Horticulture of Oregon ... Horticultural Board representatives has ...

... Pest and Their Importance

It has been felt for some time that certain inspection points in the West can and will be eliminated. The points were, after due investigation, selected on the basis of the amount of nursery stock shipment which might be inspected at ... point. Only several seasons of actual inspection work could tell the importance or value of the points selected. Inspection work at most of the points has been carried on now for ... shipping seasons. In order to determine the importance of ... points, all of the information acquired at each of the points during the last few years has been compiled in Table No. 1. This table shows at each point for each season ... of transportation ... packages inspected ... that were found.

... summary of Table I, ... only the total material ... point.

Table I ... inspection work for the fall of ... season was not included with the other seasons because the information was not recorded in the same form as that of ... A further reason for this was the change in the ... which became effective this fall. ... would change the ...

In Table III all past work is combined with this fall's inspection work.

... the West and ...

On the basis of the ... in this report, the elimination of the following ... is recommended:

Ogden and Pocatello:

1. Because of the lack of results obtained in the past.

2. Inspection work at middle western points controls practically all of the material at these points.

3. A state inspector is located at each point. Arrangements could be made for this inspector to take care of the little inspection in transit which it is possible to do at these points. The inspectors at each point are dependable and well qualified, and I feel sure that the states concerned would be glad to extend this cooperation if the Federal Horticultural Board desired this arrangement.

4. A special investigation of this matter last spring by Mr. Johnson recommends their elimination. His report has already been given in this report.

Pendleton and Pasco:

1. Less than one violation per season has been intercepted at these points.

2. The material that is inspected is mostly of local origin and only going a short distance.

3. Apparently no nurseries in the Yakima Valley intend to ship any blister rust host plants out of the state.

Table No. II

Summary of Inspection Work by Inspection Points Spring 1923 to Fall 1926

Inspection Point	Origin of Shipments										Total Shipments Inspected				Total Vio-lat-ions	Violations Found					
	E. Q. Z.			W. Q. Z.			Not Q. Z.									Federal			State		
	P. P.	Expr.	Frt.	P. P.	Expr.	Frt.	P. P.	Expr.	Frt.	Loose P. P.	P. P.	Expr.	Frt.	Grand Total		P.P.	Ex.	Frt.	P.P.	Ex.	Frt.
Pasco	254	671	13	3682	4516	263	1089	2587	457	2453	7478	7774	733	15985	4	1	3	0	0	0	0
Pendleton	361	689	410	1415	1627	1009	1433	2273	699	1443	4652	4589	2118	11359	5	1	4	0	0	0	0
Portland	4802	1776	221	5752	2617	1071	3338	2233	390	4142	18034	6626	1682	26342	42	16	7	18	1	0	0
Seattle	2221	1106	31	13386	4696	204	4553	1623	149	4698	24858	7425	384	32667	119	41	6	0	61	11	0
Spokane	27553	1854	124	4593	5294	426	5213	4059	576	4227	41586	11207	1126	53919	13	6	3	0	1	3	0
Tacoma	1132	138	15	3074	1235	153	714	475	39	2568	7488	1848	207	9543	15	6	4	0	3	1	1
Ogden	449	535	31	60	486	8	383	388	54	128	1020	1409	93	2522	1	0	1	0	0	0	0
Pocatello	21	25	0	2	0	0	37	41	0	22	82	66	0	148	0	0	0	0	0	0	0
Total	36793	6794	845	31964	20471	3134	16760	13679	2364	19681	105198	40944	6343	152485	199	71	28	18	66	15	1

Table No. III

Summary of Inspection Work to End of 1926

Inspection Point	Shipments Inspected			Violations		
	To Fall 1926	Fall 1926	Total Shipment	Total	To Fall 1926	Fall 1926
Pasco	15985	272	16257	4	4	0
Pendleton	11359	99	11458	5	5	0
Portland	26343	1246	27588	42	42	0
Seattle	32667	4932	37599	137	119	18
Spokane	53919	1688	55607	16	13	3
Tacoma	9543	850	10393	15	15	0
Ogden	2522	--	2522	1	1	-
Pocatello	148	--	148	-	-	-
Total	152485	9087	161572	220	199	21

Certification and Listing of Contents of Nursery Shipments

Incidental to our regular inspection work, the inspectors have been reporting shipments which they observed that had no certificate of inspection or had inspection certificates that were out of date. Information was also recorded regarding whether or not the contents of the shipment was listed. Very probably only a small percentage of the actual number of violations of these regulations have been recorded.

The following table gives a summary of this information.

SUMMARY - Certification of Nursery Stock

State	No. Cities Shipping	Kind of Plants	Number Shipments: Nurseries	Number Shipments: Individ.	Number Shipments: Unknown	Number Shipments: Total	Transporting Agency: P.P.	Transporting Agency: Exp.	Transporting Agency: Frt.	Transporting Agency: Unknown	Kind of Violation: Contents Not Listed	Kind of Violation: No Certif.	Kind of Violation: Certif. Expired
Calif.	5	Shrubs, trees	2	2	1	5	3	2	0	0		4	1
Idaho	8	Herbs, bulbs, trees, shrubs	5	6	0	11	6	5	0	0	3	6	4
Ill.	5	" bulbs, trees, shrubs	8	6	0	14	13	0	0	1	2	7	6
Ind.	3	Shrubs, trees	3	1	1	5	5	0	0	0	3	2	2
Iowa	5	" herbs, trees, bulbs	13	3	0	16	12	3	0	1	4	4	8
La.	1	Trees	0	* 1	0	1	1	0	0	0	0	1	0
Maine	1	Herbs, bulbs	3	0	0	3	3	0	0	0	0	3	0
Mass.	4	" , shrubs, trees	4	1	0	5	2	3	0	0	5	0	0
Mich.	7	" , shrubs, trees, bulbs	9	1	0	10	10	0	0	0	7	2	3
Mo.	2	Trees, vines	23	1	0	24	3	17	4	0	23	1	0
Minn.	4	Trees, shrubs, herb-roots, bulbs	4	0	2	6	5	1	0	0	2	5	0
Mont.	4	Shrubs, herbs	3	1	1	5	3	2	0	0	3	4	1
Neb.	1	Trees, shrubs	9	0	0	9	5	3	1	0	7	3	0
N. J.	3	Trees, shrubs	3	0	0	3	2	1	0	0	3	1	0
N. Y.	6	" shrubs, herbs, bulbs	15	1	0	16	13	2	0	1	9	1	8
N. C.	1	"	0	2	0	2	2	0	0	0	2	0	0
N. D.	1	Shrubs	1	0	0	1	1	0	0	0	1	0	0
Oregon	8	" trees, herbs, bulbs	43	7	0	50	24	13	13	0	22	14	19
Ohio	7	" herbs, bulbs	13	1	0	14	13	1	0	0	8	9	3
Penn.	8	" trees, herbs, bulbs	48	10	0	58	52	6	0	0	20	29	21
Tenn.	1	"	1	0	0	1	1	0	0	0	1	0	1
Texas	1	Trees	1	0	0	1	0	1	0	0	0	0	1
Wash.	41	" , shrubs, herbs, bulb	165	33	5	203	146	38	13	6	40	183	5
Wisc.	3	Herbs, trees, shrubs	3	1	0	4	3	1	0	0	2	2	0
D. C.	1	Trees	1	0	0	1	1	0	0	0	1	0	0
Vt.	1	Bulbs	0	1	0	1	1	0	0	0	1	0	0
	132		381	78	10	469	330	99	31	9	175	281	81

SCOUTING FOR BLISTER RUST IN EASTERN BRITISH COLUMBIA, 1926

by
H. N. Putnam, Ass't.Pathologist

* * *

I Introduction

A. Results of Scouting in Eastern British Columbia Previous to 1926

It is well to make a brief summary of results of scouting in eastern British Columbia previous to 1926, full reports of which may be found in the annual reports of this office for the years 1922, 1923, 1924 and 1925.

In 1922 blister rust was found well established on white pines and black currants east of the dry belt at Revelstoke, Beaton and Canoe, in the northern extension of the western white pine forests, approximately 150 miles north of the Idaho-Canadian boundary.

In the fall of 1923 two cultivated black currant infection points were found at Willow Point, near Nelson, B. C., and one cultivated black currant infection point at Grand Forks, B. C.

Since 1923 scouting in eastern B. C. has been confined principally to the region around Kootenai Lake and between that region and the United States border because the infection at Willow Point is only thirty miles north of the Canadian-Idaho border, and in the same white pine belt.

No infection was found in this region in 1924, but in September 1925 scouting showed the rest to be present on cultivated black currants at four locations in the general vicinity of the southern end of Kootenai Lake, at Taghum, Willow Point, Harrop and Proctor.

In November 1925 a short scouting trip in the vicinity of the cultivated black currant locations found infected in September 1925, showed ten white pines infected with thirteen cankers at Willow Point within 75 to 150 feet of infected black currants.

II. Scouting Performed in Vicinity of Southern End of Kootenai Lake B. C., 1926

Scouting done in eastern British Columbia in 1926 will be discussed under four headings as follows:

A. Spring scouting
B. Fall scouting
C. Analysis of white pine infection
D. Summary of scouting to date

A. Spring Scouting

1. Area Scouted:

In the spring of 1926 two short scouting trips were made in eastern British Columbia for the purpose of locating pine infection. The first trip was made by Detwiler and Putnam March 17 to 20. Scouting was performed at Nelson, along the north side of West Arm of Kootenai Lake from Nelson to Harrop Ferry and from Harrop to Proctor.

From March 27 to April 3, 1926, a scouting trip was made by Benedict and Putnam by auto. The itenerary included the following points and vicinities: Erickson, Creston, Kitchener, Willow Point, Harrop, Proctor, Crawford's Bay, Kootenai Bay, Grey Creek and Kaslo.

On May 13 and 14 Putnam made a trip to Nelson and vicinity with A. T. Davidson of the Dominion Government, formerly in charge of blister rust work in British Columbia. The trip was made for the purpose of acquainting Davidson with the locations of infections found. Very little scouting was done, results of which are shown in Table No. 3.

2. Method of Scouting:

In scouting in the early spring, special attention was given to the inspection of white pines growing within 1000 feet of cultivated black currants, whether or not the latter had been infected. It was, of course, too early in the season for blister rust to appear on the Ribes. A sketch map showing the location and number of cultivated black currants and white pines was made for each inspection point.

3. Results of Spring Scouting:

The following tables and discussions show the results of the spring scouting trips.

Table No. I gives the record of spring scouting done from March 17 to 20 and March 27 to April 3, 1926.

Table No. 1

Summary of Inspections of White Pines made in
Eastern British Columbia, March 17 to 20, and March 27 to April 1, 1926

Locality	Inspection Point	Wh. Pines examined within 1000' of Black Currants: Total	Infected	Details of Infection: Cankers No.	Stage	Year of Growth Infected	Number of Black Currants	Inspector	Date	Remarks
Erickson B. C.	Jenner	22					150	Benedict Putnam	3/27/26	Excellent places to reinspect yearly. Within 4 - 6 miles of U. S. Border.
	J. T. Vance	100					40	"	"	"
	Gross Ranch	230					300	"	"	"
Total	3	352					490			
Creston B. C.	1 mile South	8					15	"	"	
	Dane Ranch	1					25	"	3/28/26	W.P. planted 20 feet from black currants.
	2 miles West	50					25	"	"	
Total	3	59					65	"	"	
Kitchener B. C.	3/4 mile East	4					40	"	"	
Willow Point	Holmbergs	600	31	1 14 15 8 3	Discol. No.Marks Pyc.Marks Fruit.1st time Possible Cankers	1922 1920-1923 1921-1922 1920-1923 1922-1923	95	Detwiler Young Putnam Benedict Putnam	3/17/26 4/1/26	Black currants found infected fall, 1925. Last fall 10 trees with 13 cankers found infected out of 170 examined by Bedwell and Putnam.
Willow Point	Shannon Place E. of Nelson 4 1/2 miles on Balfour Road	29					100	Detwiler Putnam	3/17/26	Several 60 year old pines, 60 feet tall, 14" D.B.F. Black currants found infected Oct. 1923 - not found infected since then.
Willow Point	Soldier Settlement adjoins Shannon's on east	70	1 ?	1	Possible Resistant Canker	1921	80	Detwiler Putnam	3/17/26	Black currants found infected slightly in fall 1923. Plowed up in winter of 1926. Very doubtful canker.
	Mill Ranch (East of Soldier Settlement)	150					25	Benedict Putnam	4/1/26	Moist near stream, excellent place for infection.
Total	4	849	32	42			300			
Harrop, B.C.	McConnell	30					75	Putnam	3/29/26	
	Near McConnell	70					30	Benedict	3/29/26	
	Knaff	9					100	Put.&Ben.	3/29/26	
	McRoff	60					50	" "	3/29/26	
	Armstrong	50					35	Detwiler Putnam	3/18/26	Black currants found infected 9/14/25
	Hindley	25					200	"	3/18/26	
Total	6	244					490			
Nelson, B.C	Near Hospital East side of Nelson	12					4	Detwiler Putnam	3/17/26	Pines growing on rocky slopes West of black currants
	East and Southeast outskirts of town	300					Many	Putnam	3/20/26	Good associations of black currants and white pines found.
Total	2	312					4			
Proctor, B.C	Palmeston	275					25	Detwiler Putnam Benedict Putnam	3/18/26 3/29/26	Excellent place for infection. Stream flows through young pine growth 200 feet from black currants.
	B. D. Persur	85					4	Detwiler Putnam Benedict Putnam	3/18/26 3/29/26	Excellent. Small stream thru pines 100 feet from black currants.
	Donaldson	40					12	Detwiler Putnam	[illegible]/18/26	Pines within 30-100 feet of black currants
	Major Bros.	100					7	Detwiler Putnam	3/18/26	5 black currants infected 9/14/25
	Walton	200	1	1	Pyc. scars	1921-1922	12	Putnam	3/19/26	Infected pine near stream. Infected pine 150 feet south of black currants.
	Daniels	200	7	2 1 2 2	Fruited " " Possible	1917 1918 1919 1922	25	Putnam	3/19/26	Pines in thicket, 150 to 200 feet S. E. and E from black currants
Total	6	900	8	8			85			
Crawfords Bay, B. C.	Harrison and Gooch	600	4	1 1 1 1 1	Fruited once Fruited once Pyc.marks " " " "	1923 1921 1922-1923 1921 1922	25	Putnam Putnam Benedict	3/30/25 3/31/25	Infection occurred at 500 and 1000 feet south of blacks, altho many pines showing no infection occurred along small stream within 150 ft. of blacks. All five infections were on north and northwest sides of trees. Canker fruiting on 1923 wood showed needle infection within 1/2 in. of needle base.
	Mooney	10					100	Putnam	3/31/25	Crawfords Bay is an excellent place for scouting for pine infection. The W. pines inspected are mostly within 300 feet of blacks. Moisture conditions are good. Infection is just starting. It is probable that many of these places have pines infected, that the scouts over looked because of the fact that pine infection is just beginning.
	Westbury	200					25	Benedict Putnam	3/31/25	
	Houghton	25					7	"	"	
	Butler	12					20	"	"	
	Davis	50					200	"	"	
	Mrs. J.J.Peter	10					5	"	"	
	McGregor	8					12	"	"	
	Egilow	20					3	"	"	
Total	9	935	4	5			370			
Kootenay Bay, B. C. & vicinity	Kootenay Bay	75					Several	Benedict	3/31/26	
	Fraser	20					20	"	"	
	Dan Proctor	35					7	"	"	
Total	3	130					27	"	"	
Grey Creek, B.C.	Burge	30					50	Putnam	3/30/26	
	F. Martens (deceased)	75					50	"	"	Good area for blister rust.
	Geo. Rexson (deceased)	30					20	"	"	Good area for blister rust
	Post Office	5					3	"	"	
Total	4	140					123			
Kaslo, B.C.	In town	400	within	1500	feet of	blacks	Many	Benedict	"	
	C.P.R. tracts	45					"	"	"	
	John Tinkers	40					100	"	"	
	Passport	75					25	"	"	
	McGilvery Stubbs Wilkes McGillcuddy	100					Many	"	"	Moist situation
	Golf Club	100	Within	1500	feet of	blacks	"	"	"	
	1/2 mi. S. of Golf Course	35					6	"	"	Many favorable black currant - W. pine associations at Kaslo.
	Vacant green house 1/2 mi. from Kaslo	150					15	"	"	
Totals	8	500 445	within 1500 within 1000	ft. ft.	of blacks of blacks		146 & more			
Grand Total 10	46	4470 500	44 within	55 1500 ft.	of blacks.		2144 & more.			

SCOUTING FOR BLISTER RUST IN BRITISH COLUMBIA (Cont'd)

September 18 to 30, 1926

Place	Location	Ribes Inspection: Species	Ribes Inspection: Examined	Ribes Inspection: Infected	W.Pine Within 1000 '	W.P. Inspection: Examined	W.P. Inspection: Infected	Previous History and Remarks	Inspected By	Date
Proctor, B.C.	Mrs. Merrifield	R. nigrum	20 large 30 10 small	5	Yes	Pine infection found on Walton and Daniels land nearby.		1/2 of 1% of leaves on infected bushes infected. 3% of infected leaf surface covered with spore stages, all telial. Infection on scattered leaves, slight uredinial spread. 2 generations of spore production.	H.N.Putnam	9/25
" "	McKane	" " " vulgare	4 1	4 0	" "	"	"	1 bush 15%, 10% of each leaf; 1 bush 20%, 10% of each leaf: 1 bush 10%, 5% of each leaf: 1 bush 5%, 5% of each leaf, 2 generations of spore stages - all telial.	" "	9/25
" "	C.P.R. Depot	" nigrum	2	2	"	"	"	1 leaf infected on each bush. 2% of infected leaf surface covered by spore production. all telia. ▮ generations of spore production Very slight uredinial spread.	" "	9/25
" "	Edgecomb's store	" "	1	0	"	"	"	A. T. Davidson, May 1926, found 4 cankers, 1 fruiting-1921 wood, on 2 trees just W of store	" "	9/25
" "	R. Watton	" "	6	0	"	"	"		" "	9/25
" "	Major Bros. 1 mi. W. of Proctor	" "	8	5	"	200	0	5 B.C. found infected fall 1925. Details of infection fall 1926: bush 20% infected; bush 10% infected; bush 5% infected; bush 5% infected; bush 1 leaf infected. 4% of infected leaf surface covered by spore stages. ▮ generations of spore production. Some evidence of uredinial spread, since infection occurred in bunches. Inspected 100W.P. spring 1926 O.K.	" " Patty-Putnam	9/25 9/26
" "	Donaldson's Ranch 1 1/4 mi. W. of Proctor	" "	22	7	"	250	0	Inspected 40 W.P. 3/13/26 O.K. Details of B.C. infection: 25% infected leaves on 1 bush 1% on others. 3 generations of spore prd. Evidently uredinial spread because infection occurred on contiguous bushes, and in bunches on each bush.	H.N.Putnam	9/25
" "	Mary's Ranch 1 1/2 mi. W. of Proctor	" "	6		"				Patty-Putnam	9/26
" "	R. D. Persur 1 1/2 mi. W of Proctor	" "	4		"			Inspected 85 W.P. spring 1926 - O.K. Condition excellent for infection. W.P. within 50' of blacks, along small stream.	H.N.Putnam	9/25
" "	Appleton Ranch 2 mi. W. of Proctor	" "	5		"			Inspected 275 W.P. Spring 1926 O.K. Excellent place for blister rust along stream	Patty-Putnam	9/26
Willow Point 6 mi. E. of Nelson, B.C.	Holmberg's Ranch	" "	95	"	"	250	18 trees 20 canker	10/27/25 - 10 trees infected - 13 cankers 3/17/26 - 24 trees infected - 34 cankers 4/ 1/26 - 7 trees infected - 7 cankers 9/27/26 - 13 trees infected - 20 cankers May '26 - 16 trees infected - 16 cankers 10 B.C. bushes infected, Sept. 1925. In Sept. 1926 ▮ leaves found infected on 2 bushes.	" " " " " "	9/22 9/26 9/27
" "	Mill's just E. of Soldier Settlement	" "	25		"	50		4/1/26 inspected 150 W.P.-O.K. Ideal place for infection, stream close. 300 blacks on Soldier Settlement, 1 found infect. fall 1923	" "	9/22
" "	Shannon Ranch - 4 mi. E. of Nelson	" "	96	0	"	6	0	Oct. 1922 - Inspected bushes, O.K.; Oct. 1923, 15 bushes infected: Sept. 1926, bushes O.K. Mar. 1926, inspected 30 W.P. nearby - O.K.	" "	9/22
Nelson, B.C.	Rockliff, 1 mi. W. of Nelson	" "	3		"				" "	9/27
" "	N. P[illegible]ctor 1 1/2 mi. W. of Nelson	" "	14		"				" "	9/27
" "	P. W. Johnson 1 1/2 mi. W. of Nelson	" "	65		"				" "	9/27
Taghum, B.C.	Jones' Ranch	" "	40		"	10	0	2 black currants infected fall 1925 out of 30 inspected - E. R. Offord	" "	9/27
Thrums, B. C.	Doukhabors House 1/2 mi. E. of Thrums	" "	15		No				" "	9/27
Castlegar, B.C	McCorteff	" "	8		"			About 100 B.C. alive fall 1923 - O. K.	" "	9/27
Trail, B. C.	Deserted Ranch 6 mi. below Trail	R. vulgare	8		"			Quite resistant to smelter fumes, although apple trees are nearly killed.	" "	9/28
Rossland, B.C.	Triggs, LeRoy Ave.	R. nigrum	4		Yes				" "	9/28
" "	Next to last house W. end LeRoy Ave.	" "	2		"				" ")	9/28
" "	Walters, by school	" "	10		"			Inspected Oct. 1923 - O. K.	" "	9/28
" "	Deserted House S. of Walters'	" "	1		"				" "	9/28
" "	R. Massay	" "	1		"			Inspected Oct. 1923 - O. K.	" "	9/28
" "	Jensen	" "	5		"					9/28
" "	E. Secum	" "	4		"				" "	9/28
" "	Vacant House	" "	4		"				" "	9/28
" "	Eccles	" "	10		"				" "	9/28
" "	Hinder	" "	11		"				" "	9/28
" "	Vacant house next to Hinder	" "	9		"				" "	9/28
Columbia Gardens, B.C	Drake	" "	20		No			Inspected Oct. 1923 - O.K. Bushes defoliated by fumes, now re-leafing out again	" "	9/28
" "	▮ Deserted Ranches	" "	90		"				" "	9/28
" "	Desert. house end of rd. to Co. Gardens from Trail	" "	25		"				" "	9/28
Waneta, B. C.	A. R. Symonds	" "	50		"			Inspected Oct. 1923 - O. K.	" "	9/28
" "	A. Wary	" "	12		"				" "	9/28
" "	Slater	" "	5		"				" "	9/28
Salmo, B. C.	McKassell	" "	3		"			Inspected Sept. 1925 - O. K.	F.A. Patty	9/29
" "	F. W. Johnson	" "	3		"			" " " "	" "	9/29
" "	Smith	" "	4		"			" " " "	" "	9/29
" "	Garage	" "	8		"			" " " "	" "	9/29
" "	G. T. Matthews	" "	6		"			" " " "	Patty-Putnam	9/29
Ymir, B. C.	Mrs. Coleman	" "	3		Yes				H.N. Putnam	9/29
" "	Front of Store	" "	2		"			" " " "	" "	9/29
Erie, B. C.	Cheney	" "	12		"			Inspected Fall 1923 & 1925 in Sept. O. K.	Patty-Putnam	9/29
" "	Deserted Ranch	" "	4		"				" "	9/29
" "	J. McColm	" "	11		"				" "	9/29
Fruitvale, B.C	J. P. Bell	" "	6		"				" "	9/29
" "	Deserted Ranch 4 mi. E. of Fruitvale	" "	20		"				" "	9/29
" "	Deserted Ranch 1 mi. E. of Fruitvale	" "	8		"				" "	9/29
" "	Deserted Ranch 3/4 Mi. E. of Fruitvale	" "	45		"				" "	9/29
" "	Deserted Ranch 1½ mi. W. of Fruitvale	" "	5		"				" "	9/29
" "	E. Cornelius	" "	10		"				" "	9/29
" "	Tommey	" "	30		"				" "	9/29
" "	Swanson 1/4 Mi. E. of Fruitvale	" "	60		"				" "	9/29

Examination of Table No. I shows that unmistakable pine infection was found at three points, namely Willow Point, Proctor and Crawfords Bay, British Columbia.

Table No. II gives the analysis of pine infection in greater detail than was possible to give in Table No. I.

A pronounced characteristic of the infection on pines at Proctor was the amount of well developed cankers on 1917 to 1922 wood and the absence of young incipient cankers, altho cultivated black currants were close enough and in sufficient numbers to have caused the formation of incipient cankers similar to those found at Willow Point.

At Willow Point, on the contrary, no infections were found on wood older than 1921 - 1922 node.

At Crawford's Bay, all five cankers occurred on the north sides of the trees, indicating that infection came from the north, in the direction of the cultivated black currants.

All cankers found were cut out.

B. Fall Scouting in British Columbia

1. Area Scouted:

A scouting trip was made in eastern British Columbia by Patty and Putnam by automobile from September 18 to 30, 1926.

The route followed included the towns and vicinities in British Columbia listed below: Erickson, Camp Lister, Creston, Yahk, Moyie, Wyndall, Boswell, Crawford's Bay, Harrop, Proctor, Willow Point, Nelson, Taghum, Thrums, Castlegar, Trail, Rossland, Columbia Gardens, Waneta, Salmo, Ymir, Erie and Fruitvale.

2. Method of Scouting:

In fall scouting special attention was given to the inspection of cultivated black currants in close association with white pines. If infection was found on cultivated black currants, the white pines within 1000 feet were carefully gone over for signs of blister rust. Copies of scouting records made in the past were carried by the men in the field and locations reinspected.

A sketch map of each inspection point was made showing the location of Ribes and White Pines.

3. Results of Fall Scouting:

Table No. III shows the results of the fall scouting trip.

Table No. II

White Pine Infected with Blister Rust, March 17 - 20 and March 27 to April 3, 1926

Location	White Pine					Infection							Black Curr.		Date	Inspector	Remarks
	No.	Ht. ft.	Age Yrs.	Crown Class	Condition of tree	Stage of Canker	Year of Growth Infected	Diam. of Canker	Length of Canker (face)	Ht. of Canker Above Ground	1925 Growth beyond Canker	Side of Tree	Distance From	Direction From			
Soldier Settlement 4 1/2 mi. E of Nelson on road to Balfour	1	15	20	D.	Good	Suppressed	1921	1/2"	3/4"	4'	?	E.	75'	NE	3/17/26	Detwiler Putnam	B.c.'s have been plowed up since last fall. These bushes were found slightly infected in fall, 1925. The w.pine infection is doubtful.
Holmberg at Willow Point 6 mi. E. of Nelson on Balfour road.	31	1-3	10	S.	Good	See analyses of canker. 20 cankers, 2 of which are fruiting a little.							50-200'	E	3/17/26 4/ 1/26	Detwiler Putnam Young Benedict	No death due to blister rust. Trees growing under overstory of mixed trees giving moist conditions.
	1	3	10	D.	Fair	Fruiting	1922 & 1923	6 cankers at ground					50'	S	3/17/26	Detwiler	These cankers produced within a 6-in. layer of dead grass making a moist chamber effect.
Walton's place, Proctor, B. C.	1	7	17	Intermediate	Good	Pyc. Scars	1921 1922 Node	3/4"	6"	4'	6"	Center'	150-300'	S-W	3/19/26	Putnam	Tree growing in thicket 20' from small stream. This infection about 300' from infection on Daniel's Place. (See Map)
Daniels land Proctor, B. C. North of school. Pines in thicket Associated with cedar, hem, W.fir, Doug.fir, larch, Poplar.. No Native Ribes 3 years ago. Several b.c. bushes 20 years old had been destroyed within 200' from infected pines.	1	11	20	D.	Good	Fruited once before this year	1917	1 1/2"	16"	4'	6"	Stem	150' 150'	SE E	3/19/26	Putnam	Tree growing on edge of thicket.
	1	3	20	Int.	Fair	Several Times Fruited	1919	1/3" on stub 1 1/2" on stem	5" on stub	3'	Stub dead. 12" Growth Top of tree	S	150' 145'	SE E	3/19/26	Putnam	Stub dead. Infection entered into stem and has nearly encircled it.
	1	10	20	Int.	Fair	Several Times Fruited	1918	3/4 "	18"	3'	1 1/2"	N	160' 150'	SE E	3/19/26	Putnam	Fruiting portion of canker 10" long. Deeply cracked bark. Specimen left with St. Clair, Dist. Forester, at Nelson, B. C.
	1	3	15	Dom.	Poor	Possible Stub Infection	1921	1/4"	2"	2'	Stub Dead	N	250' 250'	SE [illegible]	3/19/26	Putnam	Possible canker.
	1	6	20	Dom.	Fair	Possible Resist-Canker	1922	1/3"	1/3"	2'	?	W	150' 250'	E SE	3/19/26	Putnam	Dead needles in center of circular area. Sunken circular area 1/3" in diam
	1	15	22	D.	Good	Fruiting last year & this year	1919	1/2"	14"	2'	2"	W	160'	SE	3/19/26	Putnam	Tree on west edge of thicket. Thick ioliage.
	1	3	25	Int.	Poor	Fruiting Several Times	1917	1/2"	9"	3	Slight	N	200'	SE	3/19/26	Putnam	Tree badly infested with aphis or some injury causing swelling of small branches and a suggestion of witches broom.
Commander Harrison estate Crawfords Bay, B. C. All infected trees found along road	1	1 1/2	10	S.	Fair	Pyc. Scars	1922 1923 Node	1/2"	2"	1'	?	N	1000	S-SW	3/30/26	Putnam	Pines located on side of road nearly under mature trees. Canker on stem.
	1	2½	10	D.	Good	Fruiting First Time	1923	1/2"	5"	1 1/2	?	[illegible]	550	S-SW	3/30/26	Putnam	Canker on side branch. Needle showing point of entrance, 1/2 in. from base of needle.
	1	8	22	D.	Good	Fruiting First Time	1921	?	?	?	?	NW	550	S-SW	3/30/26	Putnam	Two cankers on side branches
						Pyc. Scars	1922	?	?	?	?						
	1	6	14	D.	Good	Pyc. Scars	1921	?	?	?	?	NW	950	S-SW	3/31/26	Benedict Putnam	Side branch canker, 1 foot from stem. R. lac. 10 ft. live stem within 3 feet of pine.

Table No. III

SCOUTING FOR BLISTER RUST IN BRITISH COLUMBIA

September 18 to 30, 1926.

Place	Location	Ribes Inspection			W.Pine within 1000'	W. P. Inspection		Previous History and Remarks	Inspected By	Date
		Species	Examined	Infected		Examined	Infected			
Erickson, B.C.	John Huscroft	R.nigrum	9						H.N.Putnam	9/18
" "	Deserted House	" "	3		Yes				F.A.Patty	9/18
" "	W.H.McQueen	" "	300		"			Pines within 400' examined March 1926 by Putnam - Benedict - O. K.	Patty-Putnam	9/19
" "	Nott Ranch	" "	160		"			These bushes examined August 1926 by Geil, Bedwell - O. K.	" "	9/19
" "	Gross Ranch	" "	350		"			Pines within 400' examined March 1926 by Putnam - Benedict - O. K.	" "	9/19
" "	T. A. Jenner	" "	65		"			22 W.P.within 300' exam.Mar.1926 by Putnam, Benedict-O.K;Blacks exam.Oct.1923 by Patrie Putnam,O.K.;also examined fall,1922 by Putnam, O.K.	" "	9/19
" "	J. T. Vance	" "	40		"			100 W.P.within 200' exam.Mar.1926-O.K.		9/19
Camp Lister	Garfield	" "	40					Blacks inspected Sept.18,1925 - Offord	" "	9/18
" " B.C.	Mrs. Chudley	" "	60		No				" "	9/21
" " "	Mrs. Stevens	" "	23		Yes				" "	9/21
" " "	Lister Ranch	" "	13		"				" "	9/21
Creston, B. C.	Mrs. Hendy	" "	20		"				" "	9/21
" "	Compton	" "	27		No				" "	9/22
" "	Mr.Beringer(hotel)	" "	9		"				" "	9/22
" "	Deserted House 2 Mi.N.of Creston	" "	15		Yes 800'			Inspected 50 W.P. within 800' of these Blacks March 28,1926 Putnam-Benedict-O.K.	" "	9/22
" "	Dana Ranch	" "	25		Yes	1		Inspected 1 W.P. within 20' of blacks March 28, 1926 by Putnam, Benedict.	" "	9/22
Yahk, B. C.	Deserted House 6 Mi. N. of Yahk	R.petiolare	1		"				" "	9/19
" "	Deserted House 2½ Mi. S. of Yahk	R.nigrum	30		No				" "	9/19
Moyie, B. C.	Bakemen 5 Mi. S of Moyie	" "	5		"				" "	9/20
" "	E.J.Sylvester 1¼ Mi. N. of Moyie	" "	1		Yes				" "	9/20
" "	Smith - 1½ Mi/ N. of Moyie	" "	15		"			Blacks inspected 9/19/25 by Offord - O. K.	" "	9/20
		R.petiolare	20		"					
Wyndall, B.C.	E.Williams 3/4Mi. E.of Wyndall	R.nigrum	40		"			4 W. Pines inspected March 28, 1926 by Benedict-Putnam - O. K.	" "	9/22
" "	Joy (near Wm's.)	" "	20		No				" "	9/22
" "	Johnston	" "	100		"			Blacks examined Sept.1925 by Offord - O.K.	" "	9/22
" "	Ward	" "	100		Yes			" " " " " " "	" "	9/22
" "	Ashley Cooper	" "	4		No			200 bushes in Sept. 1925 nearly all dead. Inspected Sept. 1924, 1925.	" "	9/22
" "	Sexsmith	" "	16		Yes			Inspected Sept. 1925 - O. K.	" "	9/22
" "	Moon 1 Mi. E. of Wyndall	" "	140		No			" " " "	" "	9/22
Boswell, B.C.	S.J.Cummings	" "	40		Yes				F.A.Patty	9/25
" "	Higgins	" "	28		Yes				" "	9/25
" "	Mrs. Allen	" "	8		"				" "	9/25
" "	Deserted House	" "	1		"				" "	9/25
" "	Mackey	" "	3		"			Bush to be taken out this fall	" "	9/25
" "	Mrs. Russell	" "	15		"	1		" " " " " " "	" "	9/25
Crawfords Bay B. C.	Commander Harrison and Major Gooch(close together) 1 Mi. N of Crawford Hotel	" "	18		"	200	1	In Mar.1926 inspected 600W.P.,4 infected,5 cankers,2 of which had fruited. These infected trees varied in distance from 550 to 1000'S.W.of nearest black currents. All cankers were on N.or NW. sides of trees.A.T Davidson in May 1926 found 8 cankers. No infection found on black currants this year	Patty-Putnam	9/24
" "	Westbury Ranch N. of Com.Harrison	" "	23		"			Inspected 200 W.P. within 500' of blacks in March 1926 - all O. K.	" "	9/24
" "	Houghton Ranch ■ Mi.N. of Hotel	" "	7		"			Inspected 25 W.P. in March 1926 within 500' of black currants - O. K.	" "	9/24
" "	Butler Ranch 2½ Mi.N.Crawford H.	" "	1		"			March 1926 inspected 12 W.P. within 300' of blacks - O. K.	" "	9/24
" "	Hartig Ranch 3½ Mi.N. of Hotel	" "	200		"			March 1926 inspected 50 W.P. within 200' of black currants - all O. K.	" "	9/24
" "	F. H. Peterson	" "	10		"				" "	9/24
" "	Mooney Ranch 1 Mi.W. of Hotel	" "	200		"			Inspected 10 W.P.within 150' March 1926 O. K.	" "	9/24
Harrop, B. C.	Knaff Ranch 1 Mi. E. of Harrop on road to Proctor	" "	130	1	"	10	0	Inspected 9 W.P. within 600' March 1926 - O.K.Black current infection 10% on one bush Leaves mostly gone. Bush at end of row nearest road and W.P.evidently aecial hit with a slight uredinial spread. Two generations of spore production.	" "	9/26
" "	Armstrong Ranch 1/2 Mi. E. of Harrop	" "	125		"			These bushes found infected, 3 out of 35, in Sept. 1925 by H. R. Offord. 50 W.P. within 400' of black currants inspected by Detwiler Putnam, March 13, 1926 - O. K.	" "	9/26
" "	Hindley Ranch, 1 Mi/ S. of Harrop	" "	206	38	"	115	0	Inspected 25 W.P.within 100' of blacks in March 1926 by Detwiler & Putnam. Infection on 38 black currants contiguous bushes, 20% on 5 bushes, few leaves on 33 bushes.	" "	9/26
Proctor, B.C.	Daniels' Property	R.lacustre	1	1	"	200	2	Two trees infected Sept.1926, 1 dead canker 1918 (?) wood; 1 Pyc.scars-1922 wood. Mar. 1926 200 trees inspected, 7 trees infected, ■ fruiting cankers. 3/19/26.H.N.Putnam.Trees within 200' of black currants in town. R. lacustre found infected, 75% shade, 5 leaves infected, leaf tissue and spore areas dead. Very weak infection-5% of leaves infected, ½ of 1% of infected leaf surface covered	H.N.Putnam Patty-Putnam	9/25 9/26
" "	Walton Property	" "	6		"	300	1	Inspected 200 W.P.-10,20 yrs.old. 1 tree inspected not fruiting.150'S.of blacks.3/19 26-Putnam.Pine found infected inSept.26/26 was 200' SE of infected black currants. Canker on W.side of tree. Fruited twice - 1922 wood. Pine found infected 3/19/26,150' S.of black currants- not fruiting canker.	" "	9/26
" "	P.O. at Proctor	R. nigrum	2	2	"			Large B.C.bushes 200F.L.S.each,1% of leaves infected,3% of infected leaf surface covered by spore stages. 2 generations of spore production,all telial. Very slight uredinial spread. Pine infection found on Walton and Daniels' land nearby.	H. N.Putnam	9/25

Table No. IV shows in summarized form the contents of Table No. III.

General notes on Table No. IV: - Many good associations of black currants in close proximity were found in 17 of the 23 towns scouted. In particular, excellent conditions for infection occur at Erickson, Creston, Boswell, Crawfords Bay, Proctor, Harrop, Willow Point, Nelson, Taghum, Erie and Fruitvale. At the last named two points the road was east and west 10-15 miles north of the international boundary, and many black currants and nearby white pines occur.

Owing to the extremely dry summer, very little intensification of the rust developed on Ribes. Even at Proctor, where several fruiting cankers were found in March, 1926, only 28% of the black currants were found infected. On the infected bushes infection was not heavy, varying from one leaf per bush to 25% of the leaves.

Furthermore, at Crawfords Bay, where several fruiting cankers were found last spring, no infection was found this fall on black currants in close proximity to infected pines.

At Willow Point, where there have been found 93 infected white pines, and 110 cankers, only 3 black currant leaves on 95 bushes were found this fall infected with blister rust.

At Taghum, southwest of Nelson, where in September, 1925, there were found two black currants infected out of 30 examined, no infection was found this fall.

Additional pine infection was found at each of the three localities where pine infection was found in the spring of 1926. No new pine infection areas were located in the fall 1926.

The finding of one Ribes lacustre infected at Proctor is significant as indicating that the rust is now entering the intensification stage.

Table No. IV

Summary of Scouting for Blister Rust in British Columbia
September 18 - 30, 1926

Town	Species	Ribes Inspection				White Pine Inspection				Locations of W. Pines Within 1000 Ft. of Black Currants
		Locations		Plants		Locations		White Pine Trees		
		Examined	Infected	Examined	Infected	Examined	Infected	Examined	Infected	
Erickson	R. nigrum	7	0	977	0					7
Camp Lister	" "	4	0	136	0					3
Creston	" "	5	0	96	0	1	0	1	0	2
Yahk	" "	1	0	30	0					0
	R. petiolare	1	0	1	0					1
Moyie	R. nigrum	3	0	21	0					2
	R. petiolare	1	0	20	0					1
Wyndall	R. nigrum	7	0	420	0					2
Boswell	" "	6	0	95	0	1	0	1	0	6
Crawfords Bay	" "	7	0	441	0	1	1	200	1	7
Harrop	" "	3	2	461	39	2	0	125	0	3
Proctor	" "	11	6	90	25					
	R. vulgare			1	0	2	2	500	3	13
	R. lacustre	2	1	7	1					
Willow Point	R. nigrum	3	1	216	2	3	1	306	18	3
Nelson	" "	3	0	82	0					3
Taghum	" "	1	0	40	0	1	0	10	0	1
Thrums	" "	1	0	15	0					0
Castlegar	" "	1	0	8	0					0
Trail	R. vulgare	1	0	8	0					0
Rossland	R. nigrum	11	0	61	0					11
Columbia Gardens	" "	3	0	135	0					0
Waneta	" "	3	0	67	0					0
Salmo	" "	5	0	24	0					0
Ymir	" "	2	0	5	0					2
Erie	" "	3	0	28	0					3
Fruitvale	" "	8	0	184	0					8
Totals 23	R. nigrum	98	7	3632	66	11	4	1143	22	68
	R. vulgare	1	0	9	0					
	R. petiolare	2	0	21	0					
	R. lacustre	2	1	7	1					
Grand Total		103	8	3669	67					

C. Analysis of White Pine Infection

It is possible, by a study of the year of pine growth infected and stage of canker development, to throw light on the year or years during which infection took place in a given locality.

Infection on pines usually enters through the needles. The fungus grows through the needle and enters the bark at the base of the needle. It then proceeds to spread through the cambium in all directions. Consequently the age of the wood at the center of the canker is considered as the year of growth first infected.

Lachmund in field studies of the blister rust in British Columbia, has shown that in the majority of cases, the rust attacks growth one year old, although occasionally current season's growth, and growth two or three years old is attacked. Hence, in an analysis of a group of cankers infection is considered as taking place the year following the year of growth showing the greatest number of cankers. For example, if a given analysis shows a few cankers formed on 1921 wood, many on 1922 wood, a few on 1923 growth and none on younger growth, the inference is that a wave of black currant infection occurred in 1923 and caused the pine infection.

Tables Nos. V, VI and VII give the analysis of cankers found at the three pine infection locations at Kootenai Lake. While these tables are based on only the few cankers found to date, they are believed to be indicative of the time of infection.

Table No. V

Analysis of Cankers Found at Proctor, B.C.

Year of Wood Infected	Dis-color-ation	No Pycnial Marks	Fresh Pycnia	Pycnial Marks	Fruit-ing First Time	Fruiting More Than Once	Fruit-ing Re-tarded	Totals
1916								
1917						3		3
1918						2		2
1919						3		3
1920								
1921				1				1
1922				1		1	1	3
Total				2		9	1	12

From an examination of the above table, if appears that there were two waves of infection, one in 1920 and one in 1923. Infection here may be considered as in the first development of the intensification stage, that is, pines have become infected from local Ribes, which in turn, received infection from infected pines in the same stand. The cultivated black currants were the means of introducing the disease, and infecting certain pines in the stand. Once the pines become infected and produce showers of aecial spores to infect Ribes in the vicinity, the importance of the cultivated black currant decreases. In fact, were the black currants at Proctor removed now, the intensification of the rust would not be materially reduced, owing to the fact that wild Ribes at Proctor are now becoming infected. Thus it is seen that to be of the greatest benefit cultivated black currants must be removed from a region before the blister rust appears.

Table No. VI

Analysis of Cankers found at Willow Point, B. C.

Year of Wood Infected	Dis-color-ation	No Pycnial Marks	Fresh Pycnia	Pycnial Marks	Fruit-ing First Time	Fruiting More Than Once	Fruit-ing Re-tarded	Totals
1917								
1918& 19								
1920		2		2	2			6
1921		5		12	7	1	1	26
1922	1	2		8	5		1	17
1923	1			5	4		1	11
Not known								
Total	2	9		27	13	1	3	60

It is evident from an examination of the above table, that infection occurred in 1923, and possibly in 1922. It may be noted that there are 4 fruiting cankers on 1923 wood. These cankers occurred under a layer of dead grass at the bases of two small trees. The grass covering possibly served as an incubation chamber, forcing the early development of the aecial spores. At this infection center there were 95 black currants within 50 to 75 feet of many white pines one to four feet high growing under an overstory of mixed conifers and hardwoods. Very probably the humidity was sufficiently high to cause an earlier development of canker stages than is usual.

The infection at Willow Point is still in the introductory stage. That is, there is very slight evidence of intensification of infection. This is further borne out by the fact that only three infected leaves on two black currants were found this fall. It is entirely possible that the sources of this introductory stage were the pines infected in 1920 at Proctor, 20 miles east of Willow Point.

Table VII

Analysis of Cankers found at Crawfords Bay, B. C.

Year of Wood Infected	Dis-color-ation	No Pycnial Marks	Fresh Pycnia	Pycnial Marks	Fruit-ing First Time	Fruiting More Than Once	Fruit-ing Re-tarded	Totals
1917								
1918								
1919								
1920								
1921			1	1				2
1922				2	1			3
1923					1			1
Total			1	3	2			6

Based on only 6 cankers, it appears that the infection at Crawfords Bay was of 1922 origin. The infection is obviously in the introductory stage, the possible source of which was the 1920 infection at Proctor, B. C. A study of the year of growth infected at each of the three pine infections indicates that a wave of infection occurred on Ribes in 1923. This condition was also found by scouting for Ribes infections in 1923.

Thus it is evident that a study of the cankers found indicates that infection occurred in 1920 and 1923 at Proctor, and in 1923 at Willow Point and Crawfords Bay.

It is evident from an examination of the above table, that infection occurred in 1922, and possibly in 1923. It may be noted that there are 4 fruiting cankers on 1923 wood. These cankers occurred under a layer of dead grass at the bases of two small trees. The grass covering possibly served as an incubation chamber, forcing the early development of the aecial spores. At this infection center there were 95 black currants within 50 to 75 feet of many white pines one to four feet high growing under an overstory of mixed conifers and hardwoods. Very probably the humidity was sufficiently high to cause an earlier development of canker stages than is usual.

The infection at Willow Point is still in the introductory stage. That is, there is very slight evidence of intensification of infection. This is further borne out by the fact that only three infected leaves on two black currants were found this fall. It is entirely possible that the sources of this introductory stage were the pines infected in 1920 at Proctor, 20 miles east of Willow Point.

Table VII

Analysis of Cankers found at Crawfords Bay, B. C.

Year of Wood Infected	Dis-color-ation	No. Pycnial Marks	Fresh Pycnia	Pycnial Scars	Fruit-ing First Time	Fruiting More Than Once	Fruit-ing Re-tarded	Totals
1917								
1918								
1919								
1920								
1921			1	1				2
1922				2	1			3
1923					1			1
Total			1	3	2			6

Based on only 6 cankers, it appears that the infection at Crawfords Bay was of 1922 origin. The infection is obviously in the introductory stage, the possible source of which was the 1920 infection at Proctor, B. C. A study of the year of growth infected at each of the three pine infections indicates that a wave of infection occurred on Ribes in 1922. This condition was also found by scouting for Ribes infections in 1922.

Thus it is evident that a study of the cankers found indicates that infection occurred in 1920 and 1922 at Proctor, and 1922 at Willow Point and Crawfords Bay.

D. General Summary of Scouting, British Columbia, 1922 to 1926

Scouting was first begun in southeastern British Columbia in 1922. Table No. VIII shows in summarized form results of all scouting in eastern British Columbia performed by Office of Blister Rust Control to date.

Table No. VIII

Summary of Scouting Southeastern B. C. 1922-26

Host Plants Inspected	1922 examined	1922 Infected	1923 examined	1923 Infected	1924 examined	1924 Infected	1925 examined	1925 Infected	1926 examined	1926 Infected
Black Currants	10842	--	21524	36	29542	--	28850	25	3672	66
Red Currants Gooseberries	--	--	--	--	--	--	--	--	9	--
R.petiolare	--	--	--	--	--	--	--	--	21	--
OtherwildRibes	4935	--	35	--	--	--	--	--	7	1
White Pines	250		25	--	--	--	400	10	4500	75

It is evident from Table No. VIII that the rust is well established in southeastern British Columbia, beyond hope of stamping out, and that it is increasing in severity each year. It is also a safe presumption to state that the rust is much more prevalent than was found by the scouts.

Based on these two beliefs, it is within the realm of reason to expect blister rust to appear in the Idaho white pine forests following a year favorable to the development and spread of the rust.

PINE DAMAGE STUDIES
RE-ESTABLISHMENT OF EXPERIMENTAL PLOT, CHEEKYE, B. C., 1926.

by
H. N. Putnam
Assistant Pathologist.

I. Status of Plot after Burning.

A. Extent of Burn in Relation to Plot

Cheekye Plot was burned over on September 30, 1925, full description of which was given in the 1925 annual report of this Office. An examination of the plot in April 1926 showed that the burn was complete except for a small unburned island extending into the plot about 75 feet on the extreme eastern side, and a similar small area extending into the extreme western portion of the plot for a distance of approximately 130 feet. In addition to these unburned areas, there were two very small spots not burned on the south radius, one about 430 feet from the outer edge of the plot, where one planted pine survived, with the needles killed and new buds starting, and the other about 60 feet from the outer edge of the plot on which three planted pines survived. With these exceptions the plot was a total loss so far as furnishing data on the amount of infection on the planted pines.

B. Survival of Planted Pines.

Table No. 1 shows the condition of all planted pines found which survived the fire.

Table No. I

Status of Planted Pines not Burned in the Fire of September 30,1925
Examined April 21 to April 24, 1926

Radius	Pine No.	Distance from Circumference	Height (Feet)	Alive	Infected	Year of Wood Infected: Discol.	Pycnia	Remarks
East Radius on Plot	1 R	0	.8	Yes	Yes	1923		
	3 C	11	.5	Yes	No			Nearly killed by fire
	4 R	17	.6	Yes	No			
	4 C	17	.9	Yes	No			
	4 L	17	.5	Yes	No			
	4 AL	22	.5	Yes	No			
	4 AC	22	.3	Yes	No			
	4 AR	22	.5	Yes	No			
	5 R	28	.7	Yes	No			
	5 C	28	.3	Yes	No			
	5 L	28	.8	Yes	No			
	6 C	33	.5	Yes	No			
	6 R	33	.6	Yes	No			
	8 L	44	.8	Yes	No			
	8 C	44	.6	Yes	No			
	8 R	44	.7	Yes	No			
	9 R	50	.6	Yes	No			
	9 C	50	.5	Yes	No			
	9 L	50	.4	Yes	No			
	10 L	55	.5	Yes	No			
	10 C	55	.5	Yes	No			
	10 R	55	.5	Yes	No			
	11 C	60	.8	Yes	No			
	11 R	60	.3	Yes	No			
	12 R	66	.5	Yes	No			
	13 R	71	.3	Yes	No			
	13 C	71	.6	Yes	No			
	13 L	71	.7	Yes	No			
	14 C	76	.7	Yes	No			
	14 R	76	.5	Yes	No			
	14 L	76	1.0	Yes	No			
East Radius Outside Plot	2 R	Outside Plot	.6	Yes	No			
	5 C	Outside Plot	.6	Yes	No			
	5 L	Outside Plot	.8	Yes	Yes	1923		
	6 L	Outside Plot	.9	Yes	No			
	6 C	Outside Plot	.4	Yes	No			
	7 L	Outside Plot	.2	Yes	No			
	7 R	Outside Plot	.6	Yes	No			Injured by fire
	9 R	Outside Plot	.5	Yes	No			
	10 C	Outside Plot	.7	Yes	No			
	10 L	Outside Plot	.6	Yes	No			
	10 R	Outside Plot	.5	Yes	No			
	12 R	Outside Plot	.8	Yes	No			
South Radius on Plot	9 C	58	.6	Yes	No			
	10 C	64	.5	Yes	No			
	10 R	64	1.0	Yes	No			
	66 R	429	.8	Yes	No			Needles killed by fire. Terminal and adventitious buds starting
West Radius on Plot	1 C	0	.5	Yes	No			
	1 R	0	.2	Yes	No			
	2 C	5	.2	Yes	No			
	2 R	5	.3	Yes	No			
	2 L	5	.2	Yes	No			
	3 L	15	.3	Yes	No			
	3 C	15	.3	Yes	No			
	3 R	15	.7	Yes	No			
	4 R	20		No				Dead from causes other than blister rust or fire
	4 C	20	.5	Yes	No			
	4 L	20	.5	Yes	No			
	5 L	25	.4	Yes	No			
	5 C	25	.3	Yes	No			
	5 R	25	.4	Yes	No			
	6 R	30	.7	Yes	No			
	6 C	30	.4	Yes	No			
	6 L	30	.8	Yes	No			
	7 R	35	.4	Yes	No			
	7 L	35		No				Dead from causes other than blister rust or fire.
	7 C	35		No				Dead from causes other than blister rust or fire
	8 R	40	.7	Yes	No			
	8 C	40	.3	Yes	No			
	8 L	40	.7	Yes	No			
	9 R	45		No				Dead from causes other than blister rust or fire
	9 C	45	.6	Yes	No			
	9 L	45	.6	Yes	No			
	10 C	50		No				Dead from causes other than blister rust or fire
	10 L	50		No				Dead from causes other than blister rust or fire
	10 R	50		No				Dead from causes other than blister rust or fire
	11 R	55	.5	Yes	No			
	11 C	55	.3	Yes	No			
	12 C	60	.3	Yes	No			
	12 L	60	.4	Yes	No			
	12 R	60		No				Dead from causes other than blister rust or fire
	13 R	65	.7	Yes	No			
	13 C	65	.5	Yes	No			
	14 C	71	.5	Yes	No			
	14 R	71	.6	Yes	No			
	15 C	77	.2	Yes	No			
	15 R	77	.6	Yes	No			
	16 R	83	.4	Yes	No			
	16 C	83	.4	Yes	No			
	16 L	83		No				Dead from causes other than blister rust or fire
	17 L	89		No				Dead from causes other than blister rust or fire
	17 C	89	.5	Yes	No			
	17 R	89	.6	Yes	No			
	18 L	95		No	No			Dead from causes other than blister rust or fire
	18 C	95	.7	Yes	No			
	18 R	95		No				Dead from causes other than blister rust or fire
	19 R	101		No				Dead from causes other than blister rust or fire
	19 C	101		No				Dead from causes other than blister rust or fire
	20 C	107	.3	Yes	No			
	20 R	107		No				Dead from causes other than blister rust or fire
	21 C	113	.9	Yes	No			
	21 R	113	.5	Yes	No			
	21 L	113		No				Dead from causes other than blister rust or fire
	22 C	119	1.0	Yes	No			
	22 L	119		No				Dead from causes other than blister rust or fire
	22 R	119		No				Dead from causes other than blister rust or fire
	23 L	125	.5	Yes	No			
	23 R	125	.3		Yes	1923		
	24 R	131	1.0	Yes	No			
	47 C	248	.2	Yes	No			
West Radius Outside Plot	1 C	Outside Plot	.5	Yes	No			
	1 R	Outside Plot		No				Dead from causes other than blister rust or fire
	1 L	Outside Plot		No				Dead from causes other than blister rust or fire
	2 C	Outside Plot	.7	Yes	No			
	2 L	Outside Plot	.6	Yes	No			
	2 R	Outside Plot		No				Dead from causes other than blister rust or fire
	3 C	Outside Plot		No				Dead from causes other than blister rust or fire
	3 R	Outside Plot	.4	Yes	No			
	3 L	Outside Plot		No				Dead from causes other than blister rust or fire
	4 C	Outside Plot	.3	Yes	No			
	4 L	Outside Plot		No				Dead from causes other than blister rust or fire
	6 C	Outside Plot		No				Dead from causes other than blister rust or fire
	6 L	Outside Plot		No				Dead from causes other than blister rust or fire
	6 R	Outside Plot	.7	Yes	No			
	7 C	Outside Plot		No				Dead from causes other than blister rust or fire
	7 L	Outside Plot		No				Dead from causes other than blister rust or fire
	[illegible]	Outside Plot		No				Dead from causes other than blister rust or fire
	8 C	Outside Plot		No				Dead from causes other than blister rust or fire
	9 C	Outside Plot		No				Dead from causes other than blister rust or fire
	9 L	Outside Plot	.6	Yes	No			
	10 L	Outside Plot		No				Dead from causes other than blister rust or fire
	10 C	Outside Plot		No				Dead from causes other than blister rust or fire
	10 R	Outside Plot		No				Dead from causes other than blister rust or fire

"L, C, R", refers to the right, center and left rows facing towards the center on each radius.

The numbered pines not shown are those destroyed by fire.

"A" placed before a number means that in the original numbering of the pines, such pines were overlooked.

Table No. II gives in summary form data presented in Table No. I.

Table No. II.

Summary of Data on Planted Pines not Burned.

Radius	Planted Pines on Plot						Planted Pines Outside Plot					
	Number of Pines not Burned				Ave. Ht. Feet		Number of pines not burned				Ave. Ht. Feet	
	Not Infected	Infected	*Dead	Total	Not Infected	Infected	Not Infected	Infected	*Dead	Total	Not Infected	Infected
East	30	1	0	31	.58	.8	11	1	0	12	.64	.8
South	4	0	0	4	.73	0	0	0	0	0	0	0
West	44	1	18	63	.49	.3	7	0	16	23	.54	0
Totals	78	2	18	98	.54	.55	18	1	16	35	.6	.8

* Dead from causes other than blister rust or fire.

The reason for the large number of dead pines on the west radius was the shade of the dense mixed coniferous and deciduous growth, and the smothering effect of dead deciduous leaves burying the young planted pines.

Except for the planted pines shown in Table No. II no other planted pines were found surviving the fire.

C. Observations on Ribes on Burned Area.

Limited scouting for Ribes on the plot failed to locate any Ribes coming up. The chief vegetation in April 1926 consisted of bracken ferns.

On April 29, 1926 the Ribes lacustre was observed coming up on the burned area 2 1/2 chains NE of the circumference of plot on extension of NE radius. Data on the bush are as follows: Estimated original size of bush: 2 feet high, 20 feet of live stem. Size on April 29, 1926 1/2 foot high, 1 foot of live stem. Young branches coming in at crown. Roots alive. Sandy soil. Acer, Rubus, Salix, surrounding brush coming back in similar manner. Coniferous growth entirely killed.

II. Work Performed

From April 21 to April 29, 1926 work was performed at Cheekye and vicinity by a party of five men consisting of Messrs. Painter, Geil, Myers, Patty and Putnam. The first three men were employed by the Clearwater, Pend Oreille and Potlatch Timber Protective Associations in cooperation with the Office of Blister Rust Control. None of the first four named men were familiar with blister rust.

Different phases of the work performed are enumerated below and will be discussed in this report as follows:

A. Planting of healthy pines on plot.
B. Eradication of Ribes bracteosum.
C. Training in recognizing host plants infected with blister rust.

A. Planting of Healthy Pines on Plot.

There were approximately 5000 healthy western white pine, 2 year transplants, obtained from the Forest Service Nursery at Haugan, Montana. These were planted out on the original eight radii, one row of pines spaced 3 feet apart on each radius, extending from the center of the plot to several chains beyond the circumference of the original plot.

Table No. 3 shows the number of pines planted on each radius, and the limit of such planting.

Table No. III

Planting Western White Pine, April 22-24,1926.

Radius	Length	No. of Pines Planted	Limit of Planting	Remarks
North	28 Ch. 45Ft.	631	Burn	Burn extends beyond end of planting.
Northeast	28 Ch.	616	Green timber	Burn ends at 27 chains
East	24 Ch.	528	Green timber	Burn ends at 22 chains
Southeast	30 Ch.	660	Burned lodge pole stand	Many down lodgepole Burn extends to 32 chains
South	24 Ch.	528	Green timber	Burn ends at 22 chains
Southwest	31 Ch.	682	Road	Burn ends at road
West	25 Ch.	500	Edge of burn	Did not plant 17 to 18, 18 to 19, 19 to 20 chains because original planted pines were still there. Skipped pines no. 21 Ch. + 17 pines to 22 + 1 pine because of road.
Northwest	31 Ch. 43Ft.	698	Burn	Planting stopped. All Pines Planted.
Total		4843		

The 4843 pines planted represent all of the pines suitable for planting in the number obtained from Haugan, Montana.

Planting conditions were very good. Previous to planting, the ground had been soaked by heavy rains. There was very little sunshine on the days when planting was in progress.

The method used in planting was as follows: Previous to planting, each radius was surveyed and a stake placed at chain intervals showing the distance in chains from the center of the plot.

After the radii were surveyed the men were divided into two planting crews of 2 and 3 men. Each crew was equipped with a 6 foot pole notched at the 3 foot point, a spade and a basket containing the pines puddled in a mixture of dirt and water. 22 pines were counted. The count checked by each man. One man made a hole in the soil with the spade 3 feet from the plot center, in which opening Mr. Partner placed the pine and tramped it down well. Another pine was planted 3 feet from the first pine and on line of the radius, and so on. At the end of each chain the process was repeated. In this manner it was possible to insure the correct number of pines being planted between each two chain stakes.

Owing to lack of time, no permanent pine numbering system was devised. The pines were given a number according to their distance from the center, as for example pine at chain 10+10 pines would be the 10th pine 30 feet beyond the 10 chain stake.

B. Eradication or Ribes bracteosum.

It is well at this point to discuss the reasons for the eradication of R. bracteosum at some distance from the plot.

Inspections of the planted pines for signs of blister rust before the plot was burned showed that out of 93 infected planted pines 30, or 32% of them were on the east radius, and 57 or 61% were on the northeast, east and southeast radii. Furthermore, no concentration of planted pine infection was found near the outer limits of the radii. These facts suggested that possibly infection came from large quantities of R. bracteosum located on Cheekye Creek, approximately a mile northeast of the plot and on Lake Alice Creek, from 1/2 to 1 1/2 miles east of the plot. To throw light on this question, all R. bracteosum found northeast and east of the plot was eradicated. If the planted pines show heavy infection on the east radii, indications will be that infection came from sources other than the heavy concentrations of R. bracteosum previously mentioned. On the other hand, if the planted pines show no greatly increased infection on the easterly radii, it will indicate that the R. bracteosum was the source of the original heavy planted pine infection on the easterly radii.

Accordingly, the R. bracteosum was eradicated on April 25 and 26 on Cheekye and Lake Alice creeks. It occurred in bunches, often occupying 80% of the moist areas along the streams and was associated with devils club. The roots were large and long, frequently necessitating the use of a mattock.

Table No. IV shows the results of the eradication of R. bracteosum.

Table No. IV

Number, Average Height and Total Feet of Live Stem of *R. bracteosum* Found and Pulled on Lake Alice and Cheekye Creeks, April 25 and 26, 1926

Location	Distance from edge of plot	Direction from Plot	Number of R. bracteosum	Ave. Height	Total F. L. S.
Lake Alice Creek South from junction of Brackendale and Lake Alice Trails					
South 2 Ch.	40 Ch.	E-N-E	1	3	12
South 3 Ch.	39 Ch.	E-N-E	1	5	18
South 5 Ch.	36 Ch.	E-N-E	4	2 1/2	17
South 15 Ch.	35 Ch.	East	1	1/2	1/2
South 35 Ch.	40 Ch.	E-S-E	8	3	50
South 38 Ch.	40 Ch.	E-S-E	10	1	10
South 90 Ch.	70 Ch.	SE	1	2	2
Lake Alice Creek East of Trail Junction	55 Ch.	E-N-E	1	[illegible]	2
	60 Ch.	E-N-E	2	2	10
	62 Ch.		1	12	100
"	65 Ch.	E-N-E	[illegible]	6	207
	66 Ch.	E-N-E	2	1 1/2	3
	67 Ch.	E-N-E	11	5 1/2	125
	68 Ch.	E-N-E	2	2	6
	69 Ch	E-N-E	5	3	60
	70 Ch.	E-N-E	3	1	4
	71 Ch		7	1	19
	72 Ch.		1	2	10
	74 Ch.		4	5	114
	75 Ch.		1	12	75
	76 Ch.		8	5	164
	77 Ch.		15	4	165
	78 Ch.		23	8 1/2	1400
	80 Ch.		2	7	304
	82 Ch.		12	7	484
	83 Ch.		5	5	205
	84 Ch.		3	2	27
	85 Ch.		6	2	29
	87 Ch.		9	5	344
	89 Ch.		1	7	60
	90 Ch.		4	3	260
	91 Ch.		4	2 1/2	44
	93 Ch.		1	1	5
	95 Ch.		3	2	35
	96 Ch.		1	2	2
	100 Ch.		8	4	183
	115 Ch.		26	3 1/2	408
	116 to 118 Ch		306	5	8224
	119 Ch.		15	5 1/2	545
	120 Ch.		14	5 1/2	657
	124 Ch.		1	4	8
	136 Ch.		7	2	115
	142 Ch.		3	1	8
	143 Ch.		2	6	40
	144 Ch.		4	9	300
	145 Ch.		5	2 1/2	64
	14? Ch.		1	3	10
Totals for - Alice Lake Creek			570	4 1/2	14934 1/2
Cheekye Creek	1¼ to 1¾ miles	NE & NEE	142	5	4022 1/2
Grand Total			712	4 2/3	18957

The average size of R. bracteosum found was approximately 26 1/2 feet of live stem, or roughly 5 1/2 times the average height. This would indicate that the bushes were composed only of a few, rather long erect branches. The bushes were growing in mature coniferous forest, under 25 to 75 percent shade, in deep, black, moist soil.

Table No. V shows the range in height and feet of live stem of R. bracteosum pulled.

Table No. V

Number of *Ribes bracteosum* found on Lake Alice and Cheekye creeks, 1926.
Classified by Height and Feet of Live Stem

Height Classes (Feet)	Feet of Live Stem Classes								
	1	10	50	100	150	200	250	300	Total
1	73	28							101
2		105	2						107
3		87	22						109
4		45	29						74
5		23	57	3					83
6		14	32	9					55
7			12	17	1				30
8		1	36	26	1	1			65
9			1	11	1				13
10			23	26	1				50
11				1	1				2
12				10	4	3		2	19
13			1						1
14				1	2				3
Total	73	303	215	104	11	4		2	712

It is evident from Table No. V that there was a wide range in height and feet of live stem of the R. bracteosum pulled.

One bush was found 8 feet high with 10 feet of live stem, or practically consisting of a single whip 8 feet tall.

A small number of bushes were classified in the 9, 11 and 13 foot height classes. This was due to the very human trait of classifying bushes in even height classes.

The smallest bushes found were 1/2 foot high with 1/2 foot of live stem, of which there were several.

The largest bush found was estimated as being 12 feet high and having 300 feet of live stem.

Several large bushes had root crowns measuring 5 inches in diameter. Roots were found 10 feet long.

C. Training in Recognizing Host Plants Infected with Blister Rust.

During the course of the work at Cheekye instruction and demonstrations were given the men in recognizing the different stages of canker development and age of growth infected. Particular attention was given to recognizing cankers in early stages of development.

On April 27 and 28 a trip was made to Daisy Lake, 12 miles north of Cheekye, for the purpose of observing the amount of damage caused by blister rust on white pines in close proximity to R. bracteosum.

Opportunity presented itself for observing early uredinial infection. On April 25 uredinial infection was found on G. divaricata at Brackendale by Patty and Putnam. On April 27, young uredinia were found on R. lacustre and R. bracteosum at Daisy Lake by Patty, Geil, Painter, Myers and Putnam. In each of these cases the uredinial infection was seen as pale yellow spots.

III. Observations on Plot, July, 1926.

On July 26 and 28, C. R. Stillinger had occasion to be in the vicinity of Cheekye. From a cursory examination of the planted pines on the plot he estimated that approximately 85% of them were alive at that time. He observed that Acer, Alums, Populus, Epilobium and bracken ferns were coming back on the burned over area. He found no Ribes.

IV. Recommendations for Future Work at Cheekye

A. Spring, 1927.

1. It is not deemed necessary to replace dead planted pines.

2. A recheck of the area for Ribes is suggested as offering information on Ribes ecology. Four conditions are present on which data previous to the fire have been taken. These conditions are:

   a. Area burned and eradicated.
   b. Area burned and not eradicated.
   c. Area not burned and eradicated.
   d. Area not burned and not eradicated.

3. A re-eradication of areas from which R. bracteosum was removed in April, 1926.

4. A check study of planted pines to determine survival.

B. Fall, 1927.

1. Examination of planted pines for signs of blister rust.

EDUCATIONAL REPORT

by
C. R. Stillinger
Associate Pathologist

The educational work has not been a definitely organized project in the blister rust program in the past. Some educational work has been done by the different members of the office from time to time. No consistent educational program has been carried on thus far, the result being that considerable educational work has been done with one group for one season, but same group was entirely neglected the following season. In other words we have been following haphazard methods without any definite organized plan. This has been due to two reasons:

(1) Lack of there being given any serious thought to our educational programs
(2) Lack of any one individual having the time that is necessary to give to the work.

This status of affairs was realized somewhat in April of this year and some steps were taken to allow the project leader more time for this work. He was relieved of one project but still left with two large projects, educational work and quarantine work. Quarantine work takes considerably over half of his time. His summers should be consumed largely with getting into the field and keeping a fresh contact with the general work as well as securing educational material. As a result very little time is left available for constructive work on this project. It is a project whose importance and magnitude can demand the full time of one individual if it is to be put on a satisfactory basis.

The following report gives some information on accomplishments during this last year, but consists chiefly of suggestions regarding the general phases of the work as well as specific recommendations regarding different parts of the project.

Bulletin Distribution

Bulletin No. 226

Sent to all violators of quarantines		21
California, by Root		200
Idaho, by Hubert		69
Total		290

Bulletin No. 1398

Sent in Washington to owners whose black currants were eradicated, 1926		426
California, by Root		1576
Oregon, by Gooding		3300
Idaho, by Hubert	1038	
by Patch	75	1113
Montana, by Johnson		750
Washington, by Felch		75
Total		7240

Bulletin No. 1186

California, by Root	50
Oregon, by Gooding	50
Total	100

Circular No. 40

Idaho, by Hubert	200
California, by Root	700
Oregon, by Gooding	250
East, to Washington Office	4000
Total	5150

Bulletin No. 742

California, by Root	200
Oregon, by Gooding	100
Total	300

Talks and Articles Published

"Blister Rust Control in West" S. N. Wyckoff
Science Club Univ. of Southern California, Los Angeles, Calif.

"The Problem of Blister Rust Control in California" S. N. Wyckoff
Presented before California Section Society of American Foresters, San Francisco, Calif. Jan. 1926.
Published Journal of Forestry Vol. XXIV No. 8 Dec. 1926.

"Studies of White Pine Blister Rust in the West" H. G. Lachmund
Published Journal of Forestry Vol. XXIV No. 8 Dec. 1926

"Observations on White Pine Blister Rust in Great Britain and Denmark", J. S. Boyce
Published in Journal of Forestry, Vol. XXIV No. 8 Dec. 1926

"Present Status of Blister Rust Work in the West", C. R. Stillinger
Presented before Western Plant Quarantine Board
Olympia, Washington, June 9 - 11, 1926

"Proposed Changes in Blister Rust Quarantines", C. R. Stillinger
Presented before Pacific Coast Nurserymen's Association, Victoria, B. C. July 21 - 23, 1926.

"Blister Rust Control and Its Relation to Forest Management"
C. C. Strong, Presented before Oregon Agricultural College, Forestry Congress, Jan. 23, 1926.

"An Outlaw of the Pacific Northwest" G. A. Root
To be published in American Weekly

"The Cultivated Black Currant as a Factor in the Spread of White Pine Blister Rust", H. N. Putnam
Presented before Pathological Section, Northwest Scientific Association, Spokane, Wash. Dec. 28-29, 1926.

"The Present Status of White Pine Blister Rust Control Work in the West" C. R. Stillinger
Presented before Forestry Section, Northwest Scientific Association, Spokane, Washington, Dec. 28-29, 1926

"Oregon's Sugar Pine", Percy E. Melis
Published in O. A. C. Annual Cruise, March, 1926.

"White Pine Blister Rust Control and Its Relation to the Wood using Industries of the Pacific Coast" J. L. Bedwell
To be published in Forest Quarterly of the University of Washington, Seattle, Washington

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Forestry Congress, Jan. 22, [illegible]

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"The Cultivated Black Currant as a [illegible] in the Spread of White
Pine Blister Rust", H. N. Putnam
Presented before Pathological Section, Northwest
Scientific Association, Spokane, Wash. Dec. 28-29, 1926.

"The Present Status of White Pine Blister Rust Control Work in
the West" C. R. Stillinger
Presented before Forestry Section, Northwest Scientific
Association, Spokane, Washington, Dec. 28-29, 1926

"Oregon's Sugar Pine", Percy M. [illegible]
Published in O. A. C. Annual Cruise, March, 1926.

"White Pine Blister Rust Control and Its Relation to the Wood using
Industries of the Pacific Coast" J. L. Bedwell
To be published in Forest Quarterly of the University of
Washington, Seattle, Washington

Sixth Annual Western White Pine Blister Rust Conference
Timberman, Dec. 19, 1926

"Saving the Sugar Pine", G. A. Root
Farm Bureau Monthly (California) May, 1926

"No White Pine Blister Rust in this Vicinity"
Pend Oreille Review, May 20, 1926, Sandpoint, Idaho

"The Wild Currant Quarantine"
The Oregonian, Portland, Ore. March, 1926

"108 Motorists Lose Bootleg Bouquets"
The Oregonian, Portland, Ore. March 24, 1926

"Innocent Appearing Shrubs Revealed as Timber Scourges"
Robert C. Notson, Sunday Oregonian, Portland, Ore.
Sept. 26, 1926

"Black Currant Jams are Doomed in Favor of Pines of Northwest"
Spokane Daily Chronicle, Spokane, Wash.
March 22, 1926

Mimeographed Circulars & Reports Distributed

(1) Annual Office Report sent to all state leaders

(2) Western Number of Blister Rust News

California, by Root	50
Oregon, by Goodding	50
Idaho, by Hubert	17
Blister Rust Camp.	50
	167

(3) Circular Letter to all Owners in Washington who had their black currants removed during summer 1926 — 425

(4) Report of Proceedings of the Eleventh Annual Blister Rust Conference, held in Springfield Mass. Dec. 9 - 10, 1925. Sent to all permanent employees — 18

(5) Questions and answers for Idaho

Blister Rust Camp	100
Black Currant Eradication	150

(6) Quarantine Information

(a) Digest of Federal Blister Rust Quarantine to all employees

(b) Synopsis of quarantine 63 as applied to Calif. 50

(c) " " " " " " " Wash.

Distributed to Forest Service employees by Forest Service at Portland 200

(d) Synopsis of quarantine 63 as applied to Oregon

Distributed by Forest Service	250
" by Goodding in Oregon	25
" " Cole in Oregon	25
	300

(7) Suggestions to Black Currant Scouts

Idaho Black Currant men	6
Washington " " "	6
	12

Educational Work Among Temporary Employees

Thus far very little effort has been made to sell our blister rust problem to our temporary employees. By not doing this we are losing a real opportunity to do constructive educational work. This phase of our educational work falls into two divisions:

(1) Educational work among our temporary employees during the time they are employed and

(2) Follow up educational work after they have left our work and gone back to school or to other work.

Educational Work During Period of Employment

Most of our employees are foresters or foresters in the making. During the period of employment their minds are centered upon blister rust work and consequently are susceptible to blister rust instruction. Some effort has been made to do educational work among these men, but a consistent definite policy or program has not been worked out regarding this matter. Three possibilities suggest themselves as a solution to this problem, any one of which will be a step forward, all three of which would give a well rounded program.

(1) The supervisor of the project, if necessary with the aid of the educational leader, to give some time to discussing the problem at group meetings in the field. At the same time have some mimeographed literature available for distribution concerning the topic under discussion. It appears, from past experience, that it is a mistake to cover too much of the work at one meeting, consequently it seems desirable to have several short meetings and at each one discuss only one project or one phase of a project.

(2) Issue a news letter each month for all temporary employees during the period of employment. In these news letters the blister rust problem can be revived as well as current news regarding the work.

(3) Lantern slide talks in our larger camps such as the eradication camps and the reconnaissance training camps. Project leaders seem to agree that this is by far the most effective means of getting across our work. It appears rather doubtful that much attention is given to talks and literature to read. Illustrations give a mental picture which will arouse interest and leave a picture that they will get in no other way. The development of this means of educational work requires more preparation in the way of securing pictures and slides and means of developing them. However the situation is not impossible and all depends upon whether the matter is considered worth while to justify the expense. The office is provided with a lantern slide machine. If our group meeting is not located where electricity is available, there is a car available from which power may be obtained. A motor is manufactured which can be attached to any car which will generate the necessary power to run a lantern machine. It is believed that this matter is enough worth while as far as our eradication and training camps are concerned to justify the purchase of such a motor attachment which can be used on any car.

Educational Work After Period of Employment

Thus far no thought or consideration has been given to this type of educational work. It is felt that we have been missing a valuable opportunity by neglecting this phase of our work. During the course of each season's work we employ over one hundred temporary men. A few return to us for another season, but the larger percentage of these men go into other temporary forestry work and eventually into permanent positions in forestry. It is believed that a large percentage of these men retain an interest in the blister rust problem, especially if they are foresters. They are distributed throughout the Forest Service as well as with private organizations, or in connection with forestry schools or in some phase of pathological work. By follow up work these men could be kept informed regarding this problem and would prove to be a valuable center of information wherever they may be. This matter is forcibly impressed upon us by the occasional receipt of a letter from a former employee asking for information regarding the development of the problem since they left the work or asking for information, bulletins and pictures for some talk they have an opportunity to give.

The solution of this problem appears to be to develop a mailing list of all our temporary employees, with their addresses, whether still a student or what position they hold. Then once each year at least a circular letter should be sent to these men giving a summary of the year's work as well as any bulletins that have been issued during the year or call their attention to worth while articles regarding Blister Rust which have appeared during the year.

Meeting of all Blister Rust Employees

In order to review all of the Blister Rust work in the West from the inception of the work to date and in order to inform all members of the Office regarding the development of the problem, a four day conference of all employees of the Office was held in December. All members took a very active part, by delivering one or more papers or by discussing them. A stenographic report of the meeting was taken. This report, together with the papers that were read, will be mimeographed and distributed to all members of the office. This will be a very valuable addition to the reference library of Blister Rust employees. There was not a question in any one's mind of the value of this type of meeting and all hoped that this would be the first of a regular annual affair. Such a meeting, together with the news letter, will aid greatly in keeping the members of this office informed regarding the whole problem.

In order to make our vision of our problem complete, it is necessary now to tie in more closely the western and eastern work. It is recommended next year that the conference include not only a review of the accomplishments of the work during the year in the West but also a rather detailed report of the development of the work in each of the eastern states as well as a review of the research work that is being carried on in the East. I would suggest that the matter of having each state leader of the East prepare a complete report on the Blister Rust problem in his state be taken up with the Washington Office and an effort be made to get such a report to be read at our western conference and copies distributed to each of our members.

News Letter

In the rejuvinating of the educational work our greatest serious weakness was felt to be the lack of distribution of information to the permanent personel of this office. The first step in meeting and remedying this situation was the establishing of a monthly news letter. This letter was started in April. It has been issued about the fifteenth of each month and is fairly well established. The length of the news letter has varied from four to nine pages and an effort is made to include all current news of importance since the last news letter. Although it is the duty of each and every member of the office to contribute something each month, thus far very few have acquired the habit. Consequently the preparation of the contents has fallen largely to the lot of the project leader.

This news letter is distributed to all of the permanent employees of the western office and to the principal leaders in the eastern work, making at present a mailing list of about forty.

Educational Work Among Pine Owners in Inland Empire

Since the time is near at hand when it will be necessary to start an actual campaign of local control among the actual private owners of white pine in the Inland Empire, steps should be taken to organize this project and get it under way. The office has on file practically a complete list of the ownership of the timber lands in northern Idaho and eastern Washington. Some work along this line has been done in Montana but the records have not been assembled at the Spokane office.

This information should be prepared in the form of a mailing list. It seems desirable to prepare this information in two sets of cards. One set should be prepared and filed according to townships and sections, an individual card showing the name and address of the owner of each piece of land in the township. The other index would be arranged alphabetically, the card showing besides the name and address of the owner, also the land designations of his ownership and whatever is known regarding his timber. This latter list would include only those individuals or companies which own white pine, either reproduction, pole or mature timber.

Both indexes should show the forest in which located, if any, and the Protective Association.

After the preparation of this mailing list a definite program of education should be followed out, instructing them regarding the nature of the disease, the nature of white pine, the means of control, what local control is, and finally the progress of the experimental work and the results. If this project is developed this far, then the owners should be ready to receive our appeal for the actual practice of local control. Since the necessity for this appeal may arise at any time, depending upon the spread of the disease this project should be put under way immediately. It is the project of primary importance at this time and the mailing lists should be prepared completely this winter.

Educational Work in Protective Associations

A circular letter with a copy of Bulletin 742 was sent to each of the employees of the Potlatch, Coeur d'Alene and Pend Orielle associations. No information was sent out in the other two associations in Idaho because a mailing list was not received from the project leader.

No educational work was done in the protective association in Washington. This must be developed and some instruction sent out to these men each year. (Work in the other states with these organizations is given in the particular state reports.)

Circular No. 40

A revision of this circular was received from the Washington Office. The circular was further revised so that with the elimination of the exact distance for the spread of the disease from Ribes to pine and the cost per acre of eradication we should have a circular which can be used indefinitely here in the West. More bulletins of this type should be developed, eliminating the phases which are in the experimental phase and including only such parts as are well established. The results of our experimental work and data regarding the spread of the disease can be prepared in mimeographed form each season as a supplement to these circulars. 30,000 of the bulletins have been ordered for the Western Office.

Blister Rust Film

While considerable use has been made of the Blister Rust Film here in the West, as indicated by the table given below, not as much use has been given it as would have been given a shorter film. The present two reel film has largely served its purpose and should be replaced with another up to date one. It has been shown so generally that it is now only useful for showing in small towns during black currant eradication. Even in this instance a new film would be much better, since it would be up to date and corrections and improvements in the scenario will make it more satisfactory. The chief objection to the present film is that it is too long for general use.

In the production of a new film there are two possible methods of procedure:

(1) to revise the old scenario, eliminating certain parts of it so as to shorten the film and revise the legends,
(2) develop a new scenario. The latter seems more desirable eventually but the former seems to be the necessary expedient if we are to have a film for use during this next season.

The film is the most satisfactory means of presenting our problem to the public. For this reason it is believed that it is highly desirable that some films should be taken each summer as the work develops. If this were done our film or films could be kept up to date and revised each winter so as to emphasize the different phases of our work at the time that it was desirable to do so.

The following table gives a summary of the use which has been made of the two reel film in the West during the last year.

Use of Blister Rust Film in the West

	No. of Towns					No. of Days Shown					Attendance				
	Mont.	Ida.	Wash.	Ore.	Calif.	Mont.	Ida.	Wash.	Ore.	Calif.	Mont.	Ida.	Wash.	Ore.	Calif.
January	1			4		1			9		250			640	
February				1					3					200	
March															
April															
May															
June		4					4					700			
July		3	4		4		4	4		7		1100	1590		2767
August		3	6		4		5	6		4		1475	2525		845
September			2		4			2		4			200		629
October					2					5					1193
November															
December															
No data	?					10					1000				
Total	1	10	12	5	14	11	13	12	12	20	1250	3275	4315	840	5434
Grand Total					42					68					15114

Educational Work in Schools

It is felt that there are two distinct divisions of this work:

(1) The educational work in the high schools and grades, and
(2) That in the higher institutions of learning.

Educational Work in High Schools and Grades

In the past considerable has been done in Montana, Idaho and Oregon in the way of school campaigns. The chief emphasis has been upon the black currant eradication campaign. Since this campaign has been largely completed it is believed undesirable to continue such general campaign. Any work done in these schools from now on should be of a very specific nature and limited to those districts which actually have white or sugar pine which should be protected from Blister Rust.

Educational Work in Higher Institutions of Learning

In this field some progress has been made but the situation is far from satisfactory. In the Botany and Plant Pathology classes at Oregon Agricultural College, Corvallis, Oregon a very good course is given. This is exactly what is desirable in each institution of higher learning which has classes in Botany, Forestry or Plant Pathology. Each state leader should be in close touch with all of these possible places of having educational work done, endeavor to get the study of Blister Rust established and see that the instructor is kept supplied with the latest information and material for use in these classes.

Fairs

As far as educational work at fairs is concerned, this work falls into two distinct divisions:

(1) Interstate and State Fairs
(2) County and Local Fairs

Interstate and State Fairs

I doubt that attempts to have demonstrations at such fairs are worth while for two reasons:

(1) Competition is very keen between demonstrators for the attraction of those in attendance. As a result much time and expense must be expended if the demonstration is to draw any attention. We are not able to prepare satisfactory demonstrations for these fairs.

(2) As a rule there is such an enormous number of demonstrations that very little attention is given to any particular one.

County and Local Fairs

If we expect to carry on black currant work in the community or the community has white pine which should be protected from blister rust, then by all means these fairs should have a demonstration each year until we have accomplished our purpose. Here competition between demonstrations is not severe because they are not so abundant and are not prepared on such an elaborate scale. As a result we can prepare satisfactory demonstrations at these fairs.

Further, those who attend these fairs give considerable time to each demonstration and the man in attendance has an opportunity to talk to them generally.

Distribution of Specimens of Blister Rust

A standard method has been developed in the preparation of blister rust specimens for distribution. Specimens of white pine are placed in heavy test tubes varying in diameter from one-half inch to one inch and from six to eight inches long. The preserving fluid consists of two parts of formaldehyde, ten parts of glycerine and eighty-eight parts of water. The tubes are tightly corked and the cork and glass sealed by means of sealing wax. This makes a very good display specimen and one that will stand considerable handling. It is very difficult to open the tube without actually breaking it.

Ribes leaf specimens are prepared on four by six inch mounts of heavy cardboard, covered with cotton and faced with celluloid. The sides are stapled together and the entire mount bound with heavy black binding tape. In the past considerable difficulty has been experienced in making the tape stick to the celluloid. By applying a little acetic ether to the celluloid it has been found possible to make the tape adhere as firmly to the celluloid as it does to the cardboard. This makes a neat, safe and durable mount for display purposes.

Further information regarding the educational work is given in the reports of the state leaders for California, Oregon and Montana.

Expenditures

Western Office of Blister Rust Control
January 1, 1926 to June 30, 1926.

Projects	Salaries	Expenses	Total	Subsistence, etc.	R. R. Transp.	Autos Personal	Automobiles		Freight Express Drayage	Supplies and Equipment	Miscellaneous
							Rental	Operation			
1.1 - Cultivated black current location and eradication in cooperation with states.											
1.11 Montana	$628.50	$320.39	$948.89	$123.40		$196.99					
1.12 Idaho	320.00	548.75	868.75	353.65	46.38	92.71		$54.04	$1.97		
1.13 Washington	65.00	17.71	82.71	3.95		13.02			.74		
1.14 Oregon	325.17	42.56	367.73	25.53	15.00				2.03		
1.15 California	607.34	55.75	663.09	51.25	3.30					$1.20	
1.2 - Inspection of transported host plants in cooperation with the Federal Horticultural Board	3116.33	1343.95	4460.28	1158.60	110.14	73.11				2.10	
1.9 - Public information and cooperation in delaying spread of the disease.	2584.81	762.89	3347.70	338.03	102.21	275.03			18.00	21.12	$8.50
2.2 - Testing and improving physical destruction or Ribes											
2.22 Idaho	376.51	137.69	514.20	22.01	68.05					47.63	
2.24 Oregon	232.50	104.62	337.12	34.45	8.50	61.67					
2.25 California	847.50	821.56	1669.06	564.99	5.76	243.89					1.92
2.3 - Testing & Improving chemical destruction of Ribes	362.67	619.78	982.45	170.61	172.61				101.19	175.37	2.25
2.4 - Ecological Studies	1300.00	241.69	1541.69	119.87	95.84	23.73					2.25
2.9 - Summarizing and making results available	2571.66	226.12	2797.78	119.92	16.95	89.25					
3.1 - Control reconnaissance on Federal lands											
3.12 Idaho	436.65	174.63	611.28	103.03					16.58	55.02	
3.2 Ribes eradication Federal Lands											
3.22 Idaho	2834.89	1278.87	4113.76	882.77		53.97	42.00	21.17	15.43	249.32	14.21
3.24 Oregon		39.87	39.87		3.75				8.87		27.25
3.25 California	947.58	714.98	1662.56	592.25					21.93	100.80	
3.3 Control reconnaissance on private lands											
3.32 Idaho	5312.00	1270.55	6582.55	767.07	5.81	203.28	76.00	23.35	9.26	163.59	32.19
3.34 Oregon	360.00	157.57	517.57	157.57							
3.9 Public information, demonstration and service work	1045.00	156.45	1201.45	65.05	79.31				10.29		1.80
4.1 Spread of the Rust											
4.12 Washington	306.63	436.00	742.63	238.18	15.89	181.93					
4.16 British Columbia		102.18	102.18	65.15		37.03					
4.2 Damage to Pine	360.01	329.52	689.53	230.58		90.37			8.57		
4.9 Publication of Data	533.35	42.05	575.40	12.05	30.00						
9.1 Supervision	1900.00	259.82	2159.82	93.41	166.41						
9.2 Maintenance of Field Office	2432.83	921.97	3354.80						4.90	917.07	
9.3 Miscellaneous Supplies		558.46	558.46						57.78	377.38	123.30
Total	$29806.93	$11686.38	$41493.31	$6285.37	$945.91	$1640.98	$118.00	$98.56	$277.54	$2110.60	$211.42

Expenditures

Western Office of Blister Rust Control.
July 1, 1926 to December 31, 1926.

Projects	Salaries	Expenses	Total	Subsistence Expenses	R. R. Pullman Stage, etc.	Autos Personal	Automobiles Rental	Automobiles Operation	Freight Express Drayage	Supplies and Equipment	Miscellaneous
1.1 - Cultivated black currant location and eradication in cooperation with states											
1.11 Montana	$461.67	$648.47	$1110.14	$238.00	$15.50	$394.97					
1.12 Idaho	840.00	1473.59	2313.59	1090.50	8.44			State Car $368.50	[illegible]	$2.65	$3.50
1.13 Washington	1454.50	2110.58	3565.08	1153.50	18.83	862.97			.49	69.79	5.00
1.15 California	2105.83	2329.90	4435.73	1206.90	125.08	877.81	87.80	8.10	9.93	4.25	10.03
1.2 - Inspection of transported host plants in cooperation with the Federal Horticultural Board.	2882.92	1509.76	4392.68	1059.71	380.12		51.44			4.60	13.89
1.3 - Sanitation of Nurseries 1.34 Oregon	3341.84	2864.13	6205.97	1150.44	169.51	1290.00			109.18	105.72	39.28
2.2 - Testing and improving physical destruction of Ribes											
2.22 Idaho	1201.65	85.20	1286.85	14.65	68.05					1.80	.70
2.24 Oregon	29.33	72.10	101.43	29.50		42.50					.10
2.25 California	1502.96	977.36	2480.32	482.48	427.78	25.98				23.61	17.51
2.3 - Testing and improving Chemical destruction of Ribes	1909.28	1313.42	3222.70	633.26	244.62		108.57	24.12	75.95	214.72	12.18
2.4 - Ecological Studies	1925.83	904.48	2830.31	509.51	92.39	242.22			4.11	48.60	7.65
3.1 - Control reconnaissance on Federal lands											
3.11 Montana	1793.50	592.92	2386.42	282.80	29.35	278.44			1.63		.70
3.12 Idaho	2616.50	843.81	3460.31	548.48	18.30	258.34				18.69	
3.15 California	1187.75	438.70	1626.45	233.59	132.47	62.60				1.70	8.34
3.2 - Ribes eradication on Federal lands											
3.22 Idaho	6272.57	2606.36	8878.93	1935.77	137.64	174.30			147.07	200.09	11.49
3.25 California	4270.99	2102.85	6373.84	1636.18	13.49	241.31			100.74	107.03	4.10
3.3 - Control demonstration on Federal lands 3.32 Idaho	4822.16	2317.17	7139.33	1242.73	112.59	275.31	266.67	66.47	223.94	111.36	18.10
4.1 - Spread of the Rust											
4.11 Montana	112.50	101.83	214.33	31.50		70.33					
4.12 Idaho	112.50	143.57	256.07	63.90	3.00	76.67					
4.13 Washington	137.50	168.73	306.23	89.25		78.13					1.35
4.15 California	108.34	100.53	208.87	14.95	68.07				13.21	2.50	1.80
4.16 British Columbia	198.34	143.27	341.61	78.40	7.30	57.47					.10
6. Educational work											
6.0 General education	933.33	313.52	1246.85	74.10	67.23				37.16	103.19	31.84
6.1 Montana	225.00	74.29	299.29	13.50	58.39				1.05	.75	.60
6.3 Washington	37.50		37.50								
6.5 California	500.83	154.04	654.87	56.95	6.29	51.10			25.65	9.20	4.85
9.1 Supervision	1900.00	532.42	2432.42	84.37	439.99						8.06
9.2 Maintenance of Field Office	3212.25	1001.81	4214.06								1001.81
9.3 Miscellaneous Supplies		1074.52	1074.52						157.27	804.42	112.83
Total	$46097.37	$26999.33	$73096.70	$13954.92	$2644.43	$5360.45	$514.48	S. $368.50* R. $ 98.69*	$907.38	$1834.67	$1315.81

* S.= State car - no rental charges.

* R.= Rented cars.